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CONFERENCE ON SMOKE ABATEMENT.

LONDON, 1905.

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CONFERENCE ON SCHOOL HYGIENE.

PRESIDENTIAL ADDRESS

By SIR ARTHUR W. RÜCKER, M.A., D.Sc., LL.D., F.R.S.

Delivered February 7th, 1905.

MY first duty and pleasure to-night is to welcome the members of this Conference to the University of London, and to thank you for the honour you have done me in electing me as president of your gathering. I cannot claim to be an expert in your subject, and though, as a man of science, I sympathise heartily with your aims and objects, and know something of the principles on which they are based, yet I take it that my presence here is a proof of the importance which you attach to the place of hygiene in any well-considered scheme of education.

Never, perhaps, was education more in the thoughts of the people of England than it is now. The great decentralisation, by which the control of the upbringing of our youth was handed over to local authorities, has encouraged many willing and compelled many unwilling recruits to busy themselves with educational matters. The country has not yet settled down to a system, or systems, which all approve, and we are feeling our way, in the tentative English fashion, through a mist of speeches, letters, reports, and conferences to ends which, as a nation, we do not clearly discern.

Progress has unquestionably been made in the last quarter of a century, but it is curious to note how little we have advanced towards agreement on fundamentals, and how unaltered is the attitude of those who hold conflicting opinions as to the older and newer forms of education.

Matthew Arnold's famous *jeu d'esprit*, "Friendship's Garland," was published thirty-four years ago, and he summed up the views of the

critics of that time on classical and scientific education respectively. A German professor, Arminius, wanted to know what Lord Lumpington and the Rev. Esau Hittall learnt at the great public schools they attended. "'They followed,' said I (the author), 'the grand, old, fortifying, classical curriculum.' "Did they know anything when they left?' asked Arminius. 'I have seen some longs and shorts of Hittall's,' said I, 'about the Calydonian Boar, which were not bad. But you surely don't need me to tell you, Arminius, that it is rather in training and bracing the mind for future acquisitions—a course of mental gymnastics, we call it—than in teaching any set thing, that the classical curriculum is so valuable.' 'Were the minds of Lord Lumpington and Mr. Hittall much braced by their mental gymnastics?' inquired Arminius. 'Well,' I answered, 'during their three years at Oxford they were so much occupied with Bullingdon and hunting there was no great opportunity to judge.'" To this curriculum is opposed that of "the thoughtful educator," who was principal of the Lycurgus House Academy, Archimedes Silverpump, Ph.D. "'We must be men of our age,' he used to say. 'Useful knowledge, living languages, and the forming of the mind through observation and experiment, these are the fundamental articles of my educational creed.'" The result in this case was not more satisfactory. Dr. Silverpump's pupil made an immense fortune, but the author was obliged to confess that "'his mind, *quâ* mind——.' 'You need not go on,' interrupted Arminius, with a magnificent wave of his hand, 'I know what that man's mind, *quâ* mind, is, well enough.'"

It is true that these passages already sound old-fashioned. "Longs and shorts" play a less prominent part in classical education than they used to do. No one would now regard the scientific education given by Dr. Silverpump as the best that the modern school of education could do, or as fairly to be compared with the classical course of a public school and Oxford. In 1871 the Clarendon Physical Laboratory at Oxford had only been opened for two years; the Cavendish Laboratory at Cambridge had not been built; the Owens College alone foreshadowed the Universities and University colleges which now exist in every large town. But, apart from these indications of progress, the fundamentals of the controversy are still the same. The theory of mental gymnastics is still strenuously supported, and is still attacked on the ground that, if it is all it is said to be, the results are disappointing. "The forming of the mind through observation and experiment" was in 1871 a fundamental article of the creed of the scientific school of educators, of whom Matthew Arnold's picture of Dr. Silverpump would now be a gross and unfair

caricature. Thirty-one years later Professor Armstrong contended that in the school of the future "a great part of the time will be spent at the work bench, tool in hand. . . . Scientific method will underlie the whole of education." Elsewhere the same authority remarks that "literary methods must give place to practical methods; workshop methods must take the place of didactic desk methods." On the other hand, as the recent correspondence in the *Times* shows, eminent schoolmasters can be found who contend that the literary training is so far superior that boys who have gone through some of it will, if transferred to the study of science, beat those who have in their earlier stages learnt more science and less classics. Both sides are afraid of each other, both complain that their subjects are unduly neglected. Neither party believes that the principles it upholds are secure in the struggle for existence unless supported by rigid examinational regulations. Mr. Headlam complains that "the action of the University of London, which has made Latin an optional subject in the Matriculation Examination, is already beginning to affect the schools," and that "the disuse of Latin seems to him to be a cause for serious regret"; while Professor Armstrong contends that the action of the University in putting science on the same footing as Latin is a "national disaster." On these points I shall have more to say, but, for the moment, I am content with noting that the two extreme schools of thought are as widely divided as they were thirty-four years ago, and that both disputants practically admit that there is no solid basis of public opinion to rely on; that parents, teachers, and governing bodies are none of them to be trusted, and must be kept in order by the application of rigid rules of admission to Universities.

But amid this welter of conflicting opinions I think there can be no doubt that, in the last few years, the subject in which we are chiefly interested to-night has been steadily making its way to a position of more importance in educational curricula. Sanitary science has long occupied a relatively prominent position in this country, and now the determination with which we insist on sanitary precautions strikes the foreigner with amazement.

M. Emile Boutmy, of the Institute of France, has, in "The English People," made a careful study of this country, somewhat similar to that which Mr. Bodley gave to the world in his "France." He contends that in England "there is no province with clearly defined boundaries which belongs, theoretically, to private individuals alone, and access to which is, in principle, denied to the state. If I wished," he says, "to find in the present a positive proof that the state . . . does not allow itself to be

stopped by the superstition of any collective or individual right commanding respect, I shall only have to take, and rapidly analyse, the laws relating to public hygiene." He regards it as extraordinary that the local authorities, in spite of the desperate resistance of the town council and the majority of the inhabitants, should be compelled "to carry out the work necessary to procure an adequate provision of water for each habitation, and to secure the ejection of all waste matter by a proper system of drainage." In our regulations as to the isolation of persons suffering from infectious diseases, he recognises "a power of coercion which has no parallel in France," and describes the intervention of the officer of health as "insolent and arbitrary." I do not think that average English opinion would agree that in these matters the state or the local authorities have outstepped the limits of their legitimate functions, and we should point to the reduced death-rate as a proof of the efficiency, and even necessity, of these precautions. There are points, such as the regulations with respect to the building of cottages, on which there is not the same unanimity, and it is desirable that the chance of a re-action should not be risked by going too far or moving too rapidly for public opinion to follow.

The educational position, then, at the present moment, is that there are two widely divergent schools of thought, one of which claims that the highest training can be obtained, and obtained only, by a school of education of which the study of classics is the central feature; which reserves the term "general education" for that particular type only, and stigmatises anything which diminishes the share of classics and augments that of other subjects as "premature specialisation." Nay, they go so far as to contend that classics is the best gate to mathematics, and a high authority recently quoted the evidence of a pupil "now studying for the Engineering Tripos," who "declared that he owed any mathematical proficiency he might attain to the Greek which he did at school." It is interesting to compare with this single. not to say singular instance, accurate statistics showing the success or failure of a predominantly classical education to develop high mathematical power. "Who's Who" affords no information as to the school days of twelve of the fifty Fellows of the Royal Society who may be classed as mathematicians or mathematical physicists. Of the remaining thirty-six, only five hail from the public schools. No doubt many of the others had mastered more or less classics, but the figures, at least, prove that inductions based on single instances may be very misleading.

The opposing school of educationalists contend that the allotment of a large share to the classics and a very small share to science in the prevalent type of higher secondary education makes it not general but special; that

to the predominance of literary education is largely due the backwardness of the English governing classes, not only to foster the study of science, but to deal with problems of administration and government in a scientific spirit. Mental qualities, they assert, can be developed in the laboratory, which not only cannot be cultivated but are destroyed by excessive devotion to book-learning, and they insist that science should be regarded as an integral part of a general education, at least as much as Latin, and much more than Greek. Both sides cry to the Universities to help them to maintain, or to win, the position they desire.

I have begun my address by this survey of the controversy which is raging now even more furiously than it did in Matthew Arnold's time, because I wish from the first to make it clear that the position which hygiene should take in our educational systems is but a part of the larger question of the position of science, and you will forgive me if I sometimes deal rather with the strategy which should govern the whole movement than with the tactical advantages which you have gained in the past, or may gain in the future. Your tactical position is, however, very strong. The relative importance of Greek and science affects only the education of the upper and a part of the middle classes. Hygiene is of interest to all alike. The struggle between those who would educate the mind in different ways must influence the future of all branches of science; but hygiene, apart from the fact that it occupies a place among the sciences, deals with the cultivation and health of the body, which is as much the business of the educator as is the development of the intellect. In pursuing my subject further I shall therefore regard it primarily from the point of view proper to this Congress by enquiring how far your immediate educational aims have been attained; but I shall offer no apology if the questions which arise sometimes lead me to deal with problems which affect science and educational methods as a whole.

Beginning with the earlier stages of education, a division of our subject is at once made necessary, as we must distinguish between those who go to a public elementary school, and the children whose earlier instruction is framed as a preparation for entry into the higher public or grammar schools. No doubt the boundary between the two classes cannot be defined with scientific precision, but the division serves to indicate the general circumstances of two very large and important groups. Taking the elementary school children as a class, it is certain that the education of few of them will be carried to a high standard. Some may climb the ladder of education to its loftiest rungs; many will never make the attempt, or will abandon it before they have mounted far; and, if all are to

be treated alike, the first stages of education must be such as to meet the needs of this latter class, and must contain all that it is absolutely essential that each individual should know.

Here then we at once enter upon the battle of the subjects. The time is short, and so much knowledge is so very needful that it is difficult to include it all without prematurely taxing the brains and risking the health of little lads and lasses whose school days are to be ended as soon as the law permits.

The old solution of the problem was to make their education solely literary and arithmetical, but happily this is being abandoned. Among the subjects prescribed by the Board of Education to be taught in every public elementary school is "Knowledge of the common phenomena of the external world, with special reference to the formation of a habit of intelligent and accurate observation, and to the application of that habit—in conjunction with simple forms of experiment—in the daily life and surroundings of the scholars." The word "hygiene" is not actually used in this definition, but in the introduction it is laid down that the school should give instruction "in the working of some of the simpler laws of health." The general principle that the laws of hygiene shall be inculcated from a very early age is thus admirably insisted on, and it is only necessary to ensure that the teaching shall be really practical and not the mere learning by heart of a number of more or less isolated facts. The Board of Education puts the question of the teaching of hygiene in its proper place, as part of the wider question as to how to foster a habit of intelligent and accurate observation, and to apply that habit to the daily life and surroundings of the scholars. If that habit is to be successfully cultivated, it would appear that hygiene should play a larger part in the education of town than of country children. Excellently as the subject of nature study is being developed, certain branches of it must be less practical to the town dweller than to the rustic; while the necessity of warning against dangers which arise from the neglect of sanitary laws is more urgent in a crowded than in a sparse population. If, then, the restricted time at the disposal of the teacher makes competition between the two subjects inevitable, the doctrine that the teaching should be applicable to the daily life and surroundings of the scholars leads to the result that the study of the life histories of animals, insects, and plants should be made more prominent in the country; while the facts which bear more directly on the amelioration and preservation of the lives spent in the dull streets of a workman's suburb, and under the pall which enshrouds a great city, should be specially insisted on in urban schools.

The precise subjects to be taught, and the method of teaching them, are matters rather for sectional discussion than for a presidential address; but I may be allowed to point out that a committee of the medical profession of the United Kingdom, of which Sir William Broadbent was chairman, has prepared suggested courses of teaching on hygiene and temperance for boys and girls in the public elementary schools of the United Kingdom. This is based on a scheme which had its origin in America, and is divided into five progressive sections suitable for children of different ages. Whether or no it commands, or will command, general acceptance, there can be no doubt that this and the other facts I have mentioned prove that educational and medical authorities are alive to the importance of the teaching of hygiene. It is agreed that children who have to leave school at a very early age shall not be sent into the battle of life ignorant of the simplest truths as to the construction of their own bodies, and of the most fundamental conditions for the maintenance of those bodies in health and vigour.

Nay, we may put it on still higher ground. That the ethical and physical sides of our natures act and re-act on each other is certain, though the relations between them are obscure. The habits of self-denial and self-respect, which are necessary to secure and maintain physical health, may assist in repelling the grosser forms of moral contagion, in cultivating sensitiveness to the whisperings of the monitor within, and in clearing the channels through which the intensity and the quality of those whisperings are improved. That these higher results do not necessarily follow is as true as the fact that a poor harvest is often reaped from a well-tilled soil, but neither in the one case nor in the other is occasional or even frequent failure a reason for neglecting a condition which, on the whole, makes for success.

An appeal, the first signature to which is that of our chairman, the Duke of Northumberland, has been issued to the local educational authorities of England and Wales, which sets forth as "the chief end of all true education, the moral formation of character." It was signed by representative men and women of different schools of thought and of varied walks in life. Among many practical suggestions, they lay it down that "scholars should have their attention drawn to the laws of health," and, thus, this appeal is one among many other happy omens that the time is passing away in which the neglect, nay, the injury of the body was regarded as a mark of moral elevation. We are learning that the methods of attaining sound physical, mental, and moral health are all necessary parts of a science of hygiene which transcends the mere laws of sanitation, of a science of education which goes beyond

the acquirement of knowledge, and aims at the highest development both of the individual and the race.

Turning now from the education given in elementary schools, with the assurance that the principles which this Congress would approve are being widely recognised, the question at once arises, are similar doctrines accepted in the case of children of richer parents who pass through the preparatory to the public schools? The only possible answer is that they are not, or, at all events, are not applied at the same early age.

For this I think some valid reasons can be alleged. The children of this class will not leave school when very young, and there is not the same necessity for crowding the fundamental essentials of hygienic knowledge into the instruction given in their earliest years. The question as to the best order and arrangement of the subjects of study may well have different answers according as school life terminates at the beginning or end of the teens.

It may also fairly be said that children brought up amid surroundings which are, on the whole, sanitary, learn instinctively to avoid things to which some of their less fortunate brethren are only too well accustomed. This view, I take it, is endorsed by The Royal Sanitary Institute itself. In a recent letter from the President of your Institute to educational authorities it is urged that "the proposals (of the Board of Education) with regard to dietaries and other matters of health, if adopted in the training colleges, would pass the trained teachers on to their work in life imbued with the habits and traditions of healthy living; these would then be instinctively followed in their school work." An analogous argument would show that it is less necessary to impress, by direct formal teaching, the principles of hygiene on children who are, to a certain extent, "imbued with the habits and traditions of healthy living" from their birth.

Nevertheless, regarding hygiene as a branch of science, I think it a pity that some of the elements of science do not oftener form a part of the early education of the children of well-to-do parents. A clever boy between seven and ten years of age is delighted if he is told something of such science as he can understand, is still more delighted if he is allowed to make an experiment. A tumbler of water, a glass tube closed at one end, and a candle will afford as much amusement as an expensive game, and will make the expansion of air a fact of experience. Many other simple experiments are available. They are useful, not only from the information they give, but because through them a knowledge of science becomes, not, as it is to too many educated men, a technical subject, the

details of which need be studied only by experts, but a part of the ordinary machinery of life.

According to the system now generally adopted, the child of well-to-do parents will begin Latin a year or two before he has completed his first decade, and French even earlier, and thus, *cæteris paribus*, has less time to give to the rudiments of science than is at the disposal of a pupil at an elementary school. I believe that many, who are better judges on such a question than I can pretend to be, think that the study of the classics might with advantage be postponed to a later date than that at which it is ordinarily begun. This view is, I am told, gaining ground in Germany, but, even if it is correct, the possibility of change is hindered in this country by the scholarship system, which tends to keep the abler boys to the beaten track and to prevent them from postponing the study of the principal subjects of the competition, among which that of classics is the chief. They must be begun early, and thus science (in which term I include the elements of hygiene) is crowded out.

Though I regret this, I do not think it is of vital importance if the subject is taken up later; but the curious difference between the official theory of the Board of Education as to what is desirable in elementary schools and the practice when the children of the richer classes are dealt with is deserving of notice.. For my own part, I believe that the study of the elements of science, hygiene and other, should be carried on side by side with that of language and arithmetic from a very early stage. It must be of the nature study type, and should include information on many interesting subjects rather than a detailed knowledge even of the rudiments of any one. The knowledge attained will not be of a kind which can be readily tested by examinations, but then, though they may be necessary later on, examinations should play but little part in the education of mere children. If to secure such teaching it is necessary to postpone the beginning of some other subjects, I would postpone them. I confess that the arguments in favour of Latin as an excellent intellectual exercise for quite young boys appeal to me very strongly and are supported by instances within my knowledge, but to secure some science and manual work, I would be content that Latin be taken later. "In the early years of secondary education," says Professor Michael Sadler, "we are suffering from premature Latin and Greek."

There can be no question but that some science should be taught to all children at a secondary school, and under this general heading the principles of hygiene should be included. It is a moot point whether the

inclusion of science in the school curriculum should be enforced by its inclusion in all University entrance examinations. In considering this demand it is to be noted that, though it is generally admitted that examinations play too large a part in the educational systems of this country, and that though the Board of Education has been doing what is possible to substitute inspections for examinations, yet, whenever an Englishman believes that the importance of some particular subject in the machinery of education is overlooked, he immediately cries out that it should be made a compulsory subject in some examination. A striking exception, remarkable on account of its rarity, was the attitude lately assumed by Professor Mackinder in the controversy as to the teaching of geography. Instead of relying upon an easy but dangerous aid to learning he did his best to check the cry for the furtherance of the study of geography by the pressure of the examination system. In most cases, however, "the predominancy of custom is everywhere visible, insomuch as a man would wonder to hear men profess, protest, engage, give great words, and then do just as they have done before, as if they were dead images and engines, moved only by the wheels of custom." The ordinary controversialist first cries out that examinations are ruining the country, and then assumes either that teachers are already so tied and bound by the chains of examination systems that no reform can be obtained except by adding to their fetters, or that, if they were free, they would condemn his own pet subject. There is an element of truth in both assumptions. Teachers are apt to reproduce the system on which they themselves were educated. They are often unduly conservative, and when willing to introduce reforms, they are hampered by considerations of cost and by the prejudices of governing bodies. It is also true that, if the teacher's reputation is made to depend, as it too often is, on the number of pupils whom he can pass successfully through various examination tests, he is led to ignore everything that does not directly conduce to that success. But are we, on account of these difficulties, to assume that no more excellent way can be found? The method of compelling teachers and students to follow certain curricula by means of examinations imposed by some external authority is bad in almost every way. If an attempt is made to insist on a knowledge of everything that it is desirable a well-educated person should know, the number of subjects becomes unduly large; a charge to which the matriculation examination of the University of London was at one time open. If attention is concentrated on a few specified subjects which are regarded as supremely important, not only are others neglected, but no opportunity is left to allow for the varying abilities and wants of different individuals. Such education turns out, not

works of art designed to make the most of the material at the disposal of the educational artist, but machine-made products, forced artificially to assume, as far as may be, the same forms, and disguised, though made of very different materials, so as to look as much like each other as possible. We blame the taste which delighted to encourage the deception that an earthenware lustre teapot was made of silver or Sheffield plate, but we are not ashamed to try to mould young living intelligences according to the particular rule, all must know Greek or all must know science, which we ourselves affect.

The rigid binding together of the preparatory and public schools, and of the public schools and the Universities, by inelastic examination systems does infinite harm; and, to do it justice, the re-organized University of London has done what it can to strike a blow for freedom. It has reduced the whole number of the subjects in the matriculation to five, two of which only, English and elementary mathematics, are compulsory; and has added only two other rules, viz., that one of the other subjects must be a language, and that, if that language is not Latin, one of the fundamental sciences must be taken. So elastic a system allows for the necessities of many types of education.

But the resources of a University are not exhausted if it refuses to attempt to dominate the previous education of all those who enter its doors by rigid tests, arranged, either by the narrowness of their scope or by a multiplicity of regulations, to force all would-be undergraduates not to wander far from some prescribed path. It can, as it were, take the schools themselves into partnership, and conduct its entrance examination in connection with them, and with modifications which may allow of varieties of treatment of the same subject in different schools. This the University of London has done by means of its school-leaving examination, and the result is that it is able to recognize variants of the current educational schemes, which could not have been dealt with in a single examination including very large numbers. A university may thus become, through its inspectors and by its communications with the school authorities, cognisant of the details of the curricula in the schools, and may be able to exert influence to secure the maintenance of studies which it may not think it desirable to insist upon as obligatory subjects in a general examination.

I have thought it well to explain the attitude of the University of London on this point, because it must be clearly understood that, by abandoning a particular method of enforcing its views, the University and its officers do not abandon the right to express opinions as to what is desirable in education, or to use more legitimate methods of giving effect to them.

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Because we do not forthwith insist on every candidate for membership of the University passing a preliminary test in hygiene, it does not follow that we do not heartily sympathise with efforts to give some tincture of knowledge in this subject both to those who do and those who do not begin their education in public elementary schools.

The fact is that in education, as in most things, you cannot have it both ways. You cannot both weaken the undue influence which examinations have exerted in English education, and also use examinations to enforce all the details of your own views. Especially is the latter policy inexpedient at a time when there is so little agreement on educational ideals. It has been tried, and has failed. Each university has prescribed its own conditions of admission, and no one of them has converted the country as a whole to accept its scheme. The struggle must, therefore, I suppose, continue; but, meanwhile, it is important not to injure the schools and the scholars. The multiplicity of examinations for which the schools have to prepare is a grave evil, and, if we cannot accept each other's ideals, it is, at all events, desirable that we should recognise each other's examinations. This has been done by Cambridge and London, and the Senate of the University of London have agreed to terms which there is every reason to hope that the University of Oxford will accept. Should this be so, candidates from the same school will be able to enter any one of the three universities, not, indeed, on the same conditions, but by means of an examination conducted by any one of them. Each candidate, by whomsoever he is examined, must take the subjects required by the university he intends to enter, but, subject to a few simple modifications, the syllabus of the subject is that laid down by the University which conducts the examination. All the maddening difficulties due to minor variations in the examinations, the inclusion of another rule in algebra, the exclusion of a book of Euclid, and the like, will be done away with, and it may be hoped that the schoolmaster's task will be lightened. Nor is this all; the three new universities in the North of England are compelled by their charters to carry out their entrance examination in common; and the Consultative Committee of the Board of Education have recently put forward a scheme of a still more comprehensive character. That the movement will grow I have no doubt, and though further progress is not free from difficulties, they ought not to be insuperable. This is not the occasion for continuing the discussion, and I have only entered upon it up to this point because I desired to make it clear why I urge you not to rely too exclusively upon compulsory examinations in the promotion of the study of hygiene.

But if this study be desirable in the case of the students, how much more so is it in the case of those who are hereafter to instruct them! The Board of Education, which has of late been leading the way in necessary reforms rather than waiting for public opinion to drive it to change, is fully aware of this fact, and in a letter, to which I have already referred, the President of your Institute has welcomed, "as a most helpful and satisfactory measure, the recently issued regulations of the Board of Education for the training of teachers."

It may be useful to describe shortly what the regulations, thus approved, are.

In the first place, elementary science, including laboratory work, is a compulsory subject; so are the principles and practice of teaching, for the former of which five alternative courses are proposed for students who will be examined by the Board. The first of these includes "the physical health of the scholars, the means of testing, preserving and improving it; methods of detecting and dealing with physically and mentally defective children."

The second includes hygiene, with the sub-headings, "the health and physique of children as affected by school conditions; common physical defects and ailments, and their treatment at school; physical training."

The third includes nature study. The fourth, school hygiene, with but slight modifications of the syllabus of the third course; while the fifth scheme is divided into three principal sections, of which school hygiene is one. The details of this are stated at too great length to be quoted here, but it may be sufficient to say that they are grouped under the headings: the school and the house; school conditions; powers of endurance; fatigue; and children of normal and abnormal physique. The central educational authority of the country is thus evidently awake to the importance of a teacher's knowing something of the difference between healthy and unhealthy conditions, and of his being able to convey some of this knowledge to the children he will train. Equal solicitude is shown with regard to the health of the students in training colleges themselves. Regulations are laid down as to the air space and floor space in bed-rooms and class-rooms, and as to the number of baths which must be available, and several pages are devoted to suggestions as to dietary, exercise, and other conditions of health. The attitude of the Board of Education to the whole question is admirably summed up in the prefatory memorandum.

"The students ought to have an adequate knowledge of school hygiene. They should understand the general conditions necessary for making a building or a room healthy, and for keeping it so; and they should be well

acquainted with the rules of personal health, and, so far as possible, with the physiological principles upon which these rules are based. In the case of women students, the nutritive value of food-stuffs in connection with their cost in the market, and in relation to the needs of young children should be known in outline, even though the student may not be specially qualified in domestic economy. Only thus will they know how to conduct the school as a whole with the greatest profit to the health and bodily development of scholars, and how to adapt the instruction to the limitations which are imposed in some cases by the feeble health of the children, or by the poverty or neglect of their parents."

It is less satisfactory to report that, when The Royal Sanitary Institute drew the attention of about 300 local educational authorities to the above excellent sentiments and regulations, offering assistance in the preparation or carrying out of any scheme the authority might propose to adopt, answers were received from 51 only. Of these, 21 were mere acknowledgements, and 5 were refusals to take action. Of course, the regulations of the Board of Education will compel attention to hygiene as a subject for the training of teachers, but it is to be regretted that the opportunity of obtaining advice from a body which has earned the right to give it, should be thus neglected.

The general trend of opinion is, however, unmistakable. A committee of the British Association last year drew up an outline of a scheme of hygiene for school teaching. Sir John Gorst and Professor Armstrong both dealt with the subject in their addresses to the educational section, and The Royal Sanitary Institute itself has drawn up a scheme of examination in practical hygiene for school teachers.

As regards the second division of our subject, the position of hygiene in secondary education, we may sum up, as in the case of the first, that the Board of Education and expert opinion are at one as to the importance of a study of hygiene by those who are to be teachers, and as to the general character of practicable schemes of study, and that it only remains for the local authorities and others who control training colleges to apply, as they have in part already done, precept to practice.

I speak on this point with a sense of grave responsibility, for the University of London is itself organising a great training college. The magnificent gift of the Goldsmiths' Company to the University is to be utilised, in part at all events, for the training of teachers for elementary schools. The proposal was put forward at first in a tentative way, but it has been warmly welcomed by those immediately concerned. The counties of London, Kent, Surrey, Middlesex, and the county borough of Croydon have applied for more places than we shall probably be able to provide, so

that the success of the institution, so far as numbers are concerned, is assured from the first.

No country in the world staffs its elementary schools with graduates, and it is not intended that the great majority of those who attend the Goldsmiths' College shall be candidates for a degree; but each one ought to be educated so as to raise not only the level of knowledge, but also the general cultivation and the ethical standard of his pupils. It is casting no discredit on the aims or efficiency of the educational authorities, by whom this task must in the last resort be carried out, to say that it would be a pity if universities did not share in it. It would be too much to affirm that a university should itself undertake the management of schools, indeed, this is clearly not its work: but the training of teachers is a task concerned with the final stages of the education of the teachers themselves, and, even if they cannot and ought not to enter upon a course which leads to a degree, it is well for them to pass into the sphere of university influence. No detailed course of study has as yet been finally sanctioned for the Goldsmiths' College, but a general approval has been given by the Senate to a scheme drawn up by the Board of Pedagogy, in which hygiene forms an essential feature. I need not recite the syllabus, but I think it will satisfy those specially interested in the subject.

But though the special circumstances and needs of the time have led the University to take up this work, it must not be supposed that the education of secondary teachers is not recognised as of equal urgency. For this, arrangements have already been made in the London County Council Day Training College, the distinguished principal of which is also the university professor of education. The two institutions, in both of which the University and the London County Council are interested, will, it is hoped, do much for the training of teachers.

The last point in connection with the educational ladder to which I need refer is, that the knowledge of school hygiene is required by authorities granting diplomas of education, though I confess that I am doubtful whether it always occupies a position adequate to its importance. It is, at all events, recognised, under one name or another, as an essential part of the education of those secondary teachers who undergo a formal preparation for their profession.

We have now surveyed the educational field from the elementary school to the university, and everywhere we have found that the study of hygiene is taking a more important place than it occupied a few years ago. In particular, earnest and persistent efforts are being made to give teachers

of all classes, and children in the elementary schools, some knowledge of this subject.

For the rest, I suppose that no one can foresee what will be the general result of the reconstruction of English education which is at present in progress. There is grave danger that in some districts secondary education will be starved. Some local authorities are obtaining the services either of universities or of some eminent educationalist to report on the condition of secondary education within their districts. Others are relying solely on the knowledge of their own members and officials. The variety of local conditions may justify this variety of procedure, and, indeed, much variety in the treatment of different districts; but it is most important, both that secondary education should be supported and that some root principles as to the method of conducting it should be acknowledged by all.

A most praiseworthy attempt was made at the meeting of the British Association at Southport, in 1903, to obtain a clear statement of the views of well-known authorities on school curricula. Many valuable opinions were obtained, and I confess that I think that something like the basis of an agreement might have been among those who took part in the discussion.

Putting all details aside, it is generally agreed that the curriculum for all boys should be the same, or nearly the same, up to 15 or 16 years of age; that at that age some differentiation may begin according as the pupil, who by that time must be looking ahead, is preparing for engineering and other professions depending on applied science, for commerce, or for a literary profession.

Personally, I should advocate the retention of Latin up to the stage at which the first specialisation begins, and the introduction of Greek at that point. The foundation course should consist, apart from religious instruction, of English, the elements of mathematics, French, Latin, history and geography, science, some handiwork, and, if the school is not favourably situated for the cultivation of sports, physical exercises. The beginnings of specialization may precede the passing of an examination qualifying for entrance into a university by a year or two; mathematics science, modern or ancient languages becoming predominant according to the special gifts or probable future of the pupil. The entrance examination into the university should neither attempt to test the whole of the school education (this should be done by inspection), nor should it by its extreme narrowness exalt certain subjects unduly. The University of London insists on five subjects out of a wider list than that just proposed, so as to allow for the beginnings of specialisation. As I have already explained, inspection must be trusted to see that the subjects in which the

student is not actually examined have not been neglected. In this connection most valuable work has been done by the Army Council in recognising school-leaving certificates, given by universities to inspected schools, as excusing from the qualifying examination for the army. This, it must be explained, is not the competitive examination by which the candidates are chosen, but a preliminary test to decide whether they are worth examining more elaborately. As the issue of a school-leaving certificate implies an approval of the curriculum of the school, those masters who desire the support of the universities in maintaining certain courses of study may seek to obtain it, in future, directly in the form of an approval of certain curricula suited to the school, and not, as heretofore, indirectly by forcing their pupils through an examination framed on general assumptions or special prejudices, in which their own aims and objects have not been considered.

To these closer relations between the universities and the schools I look for some relaxation of the examination chain without the introduction of undue license in the shape of curricula; in like manner I look to the success of your endeavour for the reasonable cultivation of the study of hygiene, not to its figuring in the list of subjects for matriculation, but to the steady pressure of opinion. You will insist, as you have insisted, that the elements of education shall include, not merely the study of other forms of life, but some knowledge of the dangers by which we ourselves are surrounded, and of the means of keeping them at bay. You will insist that those to whom young lives are entrusted shall have learned, as part of their business, the main outlines of hygienic science; and in extending your influence further than it has already reached, you will go forward with the consciousness that in a very short time the merits of your cause have already attained an amount of general acceptance which is as hopeful as, in educational controversies, it is rare.

CONFERENCE ON SCHOOL HYGIENE.

Wednesday Morning, February 6th, 1905.

SUBJECT: "**SCHOLARS.**"—"**Physical and Mental Development during School Life.**"

ADDRESS

By SIR LAUDER BRUNTON, LL.D., M.D., D.Sc., F.R.C.P., F.R.S.,

President of the Committee of the International Congress on School Hygiene.

WE have met together to-day to consider the question of school hygiene. As our President reminded us in his admirable address last night, hygiene is only one branch of education. We are so accustomed to use the word education that I think we are liable sometimes to forget its real meaning, and are apt to look upon it as a process of cramming into small minds a large amount of knowledge, which may be more or less of a useful kind. But the real meaning of the word is entirely different, as its derivation shows us, for it ought to be a "leading out" or "development" of faculties and powers in the individual which would otherwise remain latent. Poets sometimes see clearly and express definitely the truths which ordinary people are simply groping after, and the poet Gray, in his "Elegy in a Country Churchyard," depicts in a vivid manner the losses which the world may have sustained from undeveloped powers. He says:

"Some village Hampden who, with dauntless breast,
The little tyrant of his fields withstood;
Some mute, inglorious Milton here may rest;
Some Cromwell, guiltless of his country's blood.

The loss sustained by the world from undeveloped powers in those who are dead is beyond repair, but there are immense potentialities in the children

who are constantly growing up, and it should be our care to develop these. Our Government has recognised to a certain extent the advisability of developing latent powers, and has introduced compulsory education of mind, but such education is a small part of what is really needed. We require, in addition to mere learning, training in the capacity of thinking, training in the capacity of acting, and training in the capacity of deciding and of deciding rightly, so that both thoughts and actions shall be well directed. The object of this Conference is to decide how such training had best be given so as to turn out children possessed of healthy bodies, sound minds, and upright character.

This Conference has been arranged by The Royal Sanitary Institute to pave the way for the International Congress of School Hygiene to be held in London in the first week of August, 1907. The choice of London as a place for this meeting was chiefly due to the action of The Royal Sanitary Institute in sending an invitation and offer of assistance to the Congress at Nuremburg.

The object of the International Congress is to bring together persons interested in school hygiene from all parts of the world, to enable them to confer together, to learn from each other, and finally to agree upon the best principles of school hygiene and the best means of having them carried into practical effect.

PHYSICAL AND MENTAL DEVELOPMENT DURING SCHOOL LIFE.

By THE MOST HONOURABLE
THE MARCHIONESS OF LONDONDERRY.

I AM glad to have an opportunity of taking part in this Conference, because I am convinced that this movement for the study of school hygiene, in a *wide* sense of the phrase, is destined to render a national service of the very greatest importance. Hitherto the efforts of the several bodies that exist for the improvement of public health have not been in a very favourable position to deal with the educational side of the matter, but more and more attention will now be given to it; and there is a splendid opportunity for those who do really know the importance of school hygiene to focus their knowledge for the public benefit.

Among the matters which are of great importance I feel that the physical education of girls is at least as pressing as any, and if the movement results in the setting up of a standard in this matter, I, for one, shall think it will have justified its existence, though, of course, I believe this will only be one of the important questions which it will help us to solve.

I am particularly glad to be able to come here as a delegate of the Durham Education Authority, because I know how very earnestly they are trying to make their schools the training ground of a healthy population. With us as with other educational authorities, there is a variety of opinions about educational questions in general, but school hygiene at least is a policy upon which there is only one party.

It seems to me that the State has in the last half-century intervened so very considerably as regards the education of the children of our people, those attending elementary schools in particular, that it has, so to speak, superseded the functions of the parents and the home in relation to the child (and this applies particularly to the girls), but hitherto the State

has not, to my mind, adequately supplied their place; this is a matter of supreme importance for the present health and future development of the people in this country.

In doing so much for the provision of education for our children, the State has largely overlooked the importance of the formation of character during childhood; this, it is true, is nowadays being more recognised; and both the Board of Education and the local authorities are interesting themselves seriously in this side of the problem.

But another important matter that has been overlooked in a large measure, or, in fact, neglected, in the pressure for what I will call "book education," is the physical side of the child's development. The State takes the child away all day long from its home from three years old upwards, or at all events from five years old, and thus deprives it (and particularly the girls) of the natural means provided by home life of obtaining, even though by rule of thumb, important training in such matters as the preparation of food, the care of children, and simple laws of health. We ought, after all, to remember that some two-thirds of the girls in our schools will probably have children of their own; and therefore such knowledge, viz., that of the preparation of food, the simple laws of health, and the acquisition of regular habits, must now be provided for by the State in the school. We should not lose sight of the fact that education should develop and fit the child to lead a useful life, and not merely to develop its intellectual capacity.

More attention, it is true, is nowadays being paid to the physical education of children in our schools. But those who know most about it will agree that children are kept sitting still far too long at a time (the most unnatural thing possible for them), and that far too little attention is paid to natural outlets for the child's activities, and to providing motion and games and sensible development of the muscles, and exciting the circulation.

In schools where physical exercises have been properly taught by teachers who understand fully the value of such training, the health and appearance of the children have, as I can myself bear witness, materially and visibly improved. In the schools where I have had opportunity of working, nothing has given me greater satisfaction than to see the results in this direction. In the county of Durham, which I represent here to-day, the industrial conditions make it specially important for us to remember this side of the problem of the proper functions of the schools for our children.

Amidst all this talk, nowadays, of the physical deterioration of the race, we cannot too definitely fix our minds upon the importance of securing for the *rising* generation, i.e., for the children now in our elementary schools, full opportunities for proper physical development and carefully-arranged training in the simple domestic arts and in the rational practice of simple rules of feeding and of health generally.

If this Conference tends, as I am sure it will, to focus public attention upon this national problem, it will have been of infinite value, and I can assure everyone present that we in the North, and Durham County in particular, intend to do our part as fully as possible in this important work. I should like, before I sit down, to echo Sir Lauder Brunton's words, and to appeal to the women of the country to diffuse as much knowledge as possible, and to interest themselves in all that appertains to hygiene and the proper physical development of the children, who, it must be remembered, will be the fathers and mothers of the children who will make this country what it always has been and I trust always will be.

PHYSICAL AND MENTAL DEVELOPMENT DURING SCHOOL LIFE.

By Miss A. J. COOPER.
(OXFORD.)

I.

SOME knowledge of Hygiene should be available for all members of a civilized community, while for those who are directly concerned in the practical work of education, we need something more than this minimum. And these considerations lead me to the first point which seems to me to demand attention. What is the minimum of knowledge which should be the common property of all classes of the community? What is the further knowledge which should be required from all those who are directly concerned with school education as teachers, inspectors, examiners, and so forth?

The answers to these questions to-day will not be those of a few years hence, but both now and in the future we may consider that while the specialists are constantly working to extend the bounds of human knowledge, there will also be the need of another kind of expert whose business will be twofold: first, to select the most important truths arrived at by the specialist, and to present them in a simple and practical form which will appeal to the whole community; and second, to develop some form of what might be called applied science to furnish the educational expert with a sound basis for his work.

Some such division of labour must come. We have it already in other departments of intellectual life. We have experts in chemistry and mathematics, and we have the practical chemist and the engineer, making use of their researches; and again, we are trying to decide what form of chemistry and mathematics should enter into the educating in all our schools.

Such a division of labour implies no strict line of demarcation between the three sets of students. The specialist and the practical worker who takes advantage of his researches may in many ways supply material to each other, and if the practical educator becomes something of a specialist investigator, so much the better.

But we have not to consider *maxima* of knowledge, but *minima*, and while these may be raised as knowledge develops, we want, especially in the region of what I have called applied science, to treat our minimum of

knowledge in such a way that a spirit of true scientific method may be cultivated, and so make the most of the opportunities which the work of the education expert affords, to do research work of real value.

A considerable amount of research work has already been done by teachers, and some of this is of real value. Some of it again, might be made of value if the true aims and methods of such research work had been more fully grasped, and some of it is held by those best able to judge as a mere addition to the melancholy tale of the waste labour of the world. Here is a real need to be met; here is an opportunity to consider how best to act so that we may promote efficiency, and by wise limitation avoid the waste of labour, and at the same time give ample scope to the best type of worker.

II.

The conditions needed for normal healthy physical growth are set forth clearly and with fulness by the expert, and to many of us some of the simpler details seem so obvious as to need no further emphasis. And yet the ignorance shown in practical everyday life is greater than we are often disposed to believe. Take for example the question of eye-strain amongst children of school age.

In the building regulations of the Board of Education for secondary schools, the rule is given that in class-rooms "the principal light must be to the left hand of the scholars. Windows must never be placed so as to front scholars or teachers."

Here is a simple direction enough, and it is of course no novelty to those who have made any study of the question at all. Yet how far this is from being recognized as an essential condition of healthy school surroundings may be seen any day by those who take the trouble to look out for the facts. The architects are partly to blame. They have not recognised that what may be allowed in a dwelling-house, with its various possibilities for the individual comfort of its inmates, becomes a serious difficulty when the building is meant for class use with its strict limitations imposed by the need of orderly arrangement of desks and forms.

Then, the teachers are not always keen to make the best arrangement in their power. If the room happens to be lighted on one side only you will find the pupils sitting with the light on the right hand, or even facing that light.

And when the child goes home many a parent will pay little or no attention to this all important question of the lighting of the child's papers and books as he sits at work. We have got so far, perhaps, as to know that the work needs a good light, but what constitutes good or bad lighting is practically ignored in many schools and homes.

We may hope that the building regulations of the Board of Education will do much to raise the standard of effective knowledge on this and other points of school hygiene; but we must not rest content until in the home as well as in the school there is sound knowledge of what may be done to give the proper environment for healthy life and work.

Again, take the question of physical education. The last thirty years have seen a great development of physical exercise as part of the regular school curriculum. But the lesson in physical exercise is not the only opportunity of paying attention to the needs of the growing child, in respect both to position and movement. And the teacher of physical exercise may do the best possible work, and yet fail to produce the best results, if throughout the rest of the school routine the necessary standing and sitting positions of the pupils are treated with indifference, or as may easily happen, directed on bad lines in order to satisfy the demands of some detail of school technique. Here again we need effective knowledge, and here again we must not rest content until we secure it.

Of the value of games in the school, we are all sufficiently convinced. We are, indeed, in danger of being carried away by our enthusiasm for them, until it has become a question whether our modern life does not allow too large a space for their pursuit? We are now striving to prevent our love of games degenerating into a worship of athleticism. The first gives opportunity for mental as well as for physical development, while the last has distinctly lower value in both directions.

I do not propose to dwell upon this point, but I have introduced it because it leads up to another part of my subject.

III.

The need of bodily health, as a foundation of sound mental work, is largely recognized at the present day. The action of the mind upon the body is a far more difficult problem, and some of the studies that have been made have lent themselves in an unfortunate manner to the methods of the fanatic and one-ideaed reformer.

Yet in the control of the body by the mind lies a great part of the work of education, and for the teacher the facts of the interdependence of physical and mental development are all important. The physical and mental restlessness of present-day children is matter of common knowledge. Can our education system be considered satisfactory so long as we have not given our pupils the full power of self-control, and placed in their own hands the possibility of further developing the due correlation of physical and mental life, so that each may help the other, and both do their part in building up a race of men and women to carry on

the best traditions of the race? Here again we find the lack of effective knowledge.

In the direction of intellectual work, we have given great attention to the development of methods of teaching the various school subjects. We have studied the young child, and have noticed what kind of appeal has most easily and naturally attracted his interest and attention. This element has formed the starting point of a method, and such a method has been described as a natural method. Pleased with the results of our experiments with young children, we have adopted our natural method for older classes, and have failed to see that, with the growth of physical and mental power, different methods are needed if the pupil is not to have an unduly extended term of childish effort. As our pupils develop in power, so should our methods develop in character, without any sharp break, but with a distinct recognition of the fact that growing mental life demands fresh treatment just as surely as the body demands different forms of exercise to suit its growth and development.

Here we much need that body of ordered knowledge which should guide us in the work of education. It exists in the works of specialists; our task is to make it available as effective knowledge for all who are engaged in school work, and with such an equipment we may expect our teachers to carry on and develop the study of education as the great force which gives life and power to the whole community.

To secure for the physical life its maximum possibility of sound health; to develop the mental life side by side with this, and to enrich and strengthen it, and finally to cultivate the will-power of each individual so that he may have full control of both the higher and the lower; this is the complex which we call education.

To accomplish this task a nation needs its expert investigators, and it also needs its missionaries who can translate the truths set forth by the experts into practical, everyday form, so that they may be understood and received by all classes. And further, it needs other transmuters of the contributions of the expert, so that we may secure for the educational workers the proper basis for their intelligent practice of their art, and also for their serious study of what underlies their successes or failures. While physical and mental development may be studied separately, it is in their connection that we must seek the answer to many of our questions concerning our scholars, and such psycho-physical studies may further give to the study of education a firm base for its conquests in the future.

PHYSICAL AND MENTAL DEVELOPMENT DURING SCHOOL LIFE.

By SIR JOHN A. COCKBURN, M.D., K.C.M.G.

PHYSICAL training is all-important in early life. Mind and body interpenetrate each other like the warp and woof of one texture. It is remarkable that the recognition of the sane views of the ancient Greeks in this and many other respects should coincide with a decreasing study of their language. The body grows very rapidly between the ages of twelve and sixteen, but the brain attains almost its full weight by the end of the seventh year. The brain consists largely of motor centres, and is best developed by cultivating the muscular sense. It would be better to leave the whole area of so-called mental training to take care of itself than to neglect one jot of the physical requirements for brain growth. The brain is not now regarded so much as the autocrat of the body, but rather as a constitutional assembly in which each part of the body is represented. Fresh air, bright light, wholesome food, and abundant sleep are essentials of development. These should form, as it were, the compulsory subjects in childhood; the old-fashioned school lessons by comparison may be regarded as optional. Good nutrition is indispensable; the quality of food makes the difference between a queen bee and a stunted female worker. It is unchristian cruelty to administer instruction to a hungry child. Nature study, school excursions, modern geographical methods, and manual training have coincided in bringing wholesome influences to bear on school life. As a general rule in physical training free play is preferable to gymnastics. The movements in the former are more spontaneous and thorough. It is well known that muscles paralysed to the will contract readily under the influence of emotion.

Researches in evolution may be held to have established the view that the individual in embryonic and child-life recapitulates ancestral stages of development. The infant is but the larva of the human being. It is worse than useless to attempt to teach any subject before the requisite organs are capable of function.

Development takes place from within in accordance with the definite laws of the organism. The schoolmaster may hinder, divert, or direct, but cannot greatly augment the vital impulse. The child mind is not a mere passive receptacle for impressions, but reacts on everything submitted to it. The teacher is a gardener, not a wax flower modeller. Each function should become the subject of training as it emerges. Motor habits should be acquired in the order of development; massive movements involving the larger joints, such as the shoulder and elbow, in the first place, the finer hand and finger movements later. The pyramid of development should be broad based; irregular and convulsive discharges, such as St. Vitus' dance and stuttering, are the results of unstable equilibrium in this respect. Sense impressions should be experienced and stored during the plastic years of youth; the psychological opportunity once missed does not usually recur.

The penalties of precocity are even greater than those of delayed function. Harvest must not be looked for in spring time. Early specialization cramps, dwarfs, and kills. A high level of general culture facilitates excursions into specialism, as a mountain ascent is easier from adjacent table lands than from sea level. Even widely different studies may be mutually helpful; the sustained effort of drawing a straight line assists in learning to sing a level note.

The path of education should include some hills of difficulty, and occasionally the process should partake of the nature of an ordeal. Herein lies almost the sole advantage of examination tests. Some degree of fatigue is a condition of advancement.

From the point of view of national efficiency, character is more important than intelligence. The world is so correlated that a nation without much originality can assimilate the inventions and resources of civilization; but character cannot thus be assumed by imitation. The will in its essence is a quality of muscle.

THE MIND & PHYSICAL EDUCATION.

By EUGENE SULLY,
National Physical Recreation Society.

Physical Education defined.

BRIEFLY, physical education may be defined as the scientific training of the body, "effecting symmetry without and harmony within;" having the end always in view of strengthening and intensifying the faculties of mind, and placing them under the intelligent control of the Will.

Results of Physical Education.

In ascertaining the results of physical education, two points should be always insisted upon:

First, that pupils work under fair and reasonable conditions.

Second, that the teacher be qualified to *teach.*

Strange as it may seem, these very essential points are often lamentably ignored, especially the former.

Given these conditions, then, beneficial results, both mental and physical, must accrue.

Mental Effect of Physical Education: Examples.

Asked to describe the effect of physical education upon the mind in one word, I would answer *alertness.*

Take, for example, the raw recruit of the field-labourer type, slovenly in gait and slow in speech. After eighteen months, mark the soldier: his straightened back, the quick, decisive walk and speech of the man of action; his physique set up, his mind awake.

Mentally deficient.

Take another example from those who have the misfortune to be mentally deficient. Experience shows that the surest and quickest way of developing the brain is *indirectly* through the muscular system, by cultivating manual crafts rather than by the more direct methods usually employed; and physical exercises play a very prominent part in arousing and stimulating the mental faculties, and generally sharpening the wits.

How much more marked is the effect upon normally-minded children only these who teach can know and appreciate.

Compulsory and Educative Physical Training.

Having to confine myself in this paper to that branch of physical education with which I have most knowledge and experience, viz., the compulsory and educative side, I ask you to note what takes place when a pupil enters a gymnasium class for the first time.

The Will; Observation; Discrimination; Memory; Co-operation; Discipline; Class Drilling.

Say he stands in line for drill, soon he is left in no manner of doubt as to the necessity of thinking and moving rapidly if he would excel at all. Here then at the start the will is challenged; he must work both mind and muscle if he will take front rank, and the *effort* must come from within; choice made, the wish is promptly followed by action, *imitation* of an exercise he sees executed by others, which means the use of his powers of observation and discrimination, aided by memory, as in quick succession the movements follow one another, until the exercise is performed rhythmically and automatically. Also, a pupil often learns a valuable lesson in the meaning and spirit of co-operation, the working in unison with others for one common end. But discipline, prompt and unquestioning obedience to command, is perhaps the greatest gain derived from class drilling; hence it is that teachers of physical education lay such stress upon the necessity of drills as the foundation of a sound physical education, and an invaluable aid to mental activity.

We may say then that the effect upon the mind of class drilling is the cultivation of will, observation, discrimination, memory, and, above all, discipline (self control), without which no character is complete.

Moral and Intellectual.

The influence of physical education on the moral and intellectual development is tersely expressed by a German writer in the following succession of causes and effects:—

Health of Body ...	... Cheerfulness of Mind.
Hardening of Body ...	... Manliness of Mind.
Strength and Skill ...	... Presence of Mind and Courage.
Activity of Body ...	... Activity of Mind.
Fair development of Body	... Beauty of Soul.
Acuteness of the Senses	... Strength of the Thinking Faculty.

And this is in the main true.

Types: Melancholy; Energy.

It is instructive to observe the effect of systematic exercise upon the various types of Character. The melancholy, for instance, try as they may, cannot for long withstand the subtle influence of an atmosphere in which *energy* is, as it were, let loose, where cheerfulness reigns and self is forgotten; there is a vortex of exhilaration in a body of persons moving together in rhythmic harmony where all are unconsciously drawn in, where care and morbidity vanish as if by magic.

The Nervous.

Or again, the nervous (and they are numerous), retiring, timid, fearful; these, by encouragement *and* patience, will in time learn lessons of self-reliance and self-control in the various exercises in which fear of fall or failure *at first* seem to paralyse every fibre of their being until by practice and gentle suasion they gain a steadier nerve and eventually the confidence born of power.

The Sanguine.

The sanguine temperament, full of hope and confidence, which charges like a bull at every appliance, soon simmers down and discovers that coolness and judgment are necessary for the easy accomplishment of even the most elementary exercises, and receives a cold douche at not being master of the art of co-ordination at one fell swoop.

The Lymphatic.

The lymphatic is not a rarity, it is often found encased in an over-plump envelope supported by spindle-like legs. Upon these persons especially one sees the remarkable effect of exercise. It is a waiting game, but the reward will come. Activity communicates itself by the greatest of teachers, example, and sooner or later the contagion is, like the mumps, caught, the blood runs freely, the pores literally ooze, and the eyes brighten, the lethargic one blossoms under the compelling influence of comradeship and is seen rushing wildly around in some gymnasium game, puffing perhaps, but Alive!

Music an Educational Help.

Music *suited to the exercises* should ever be given a prominent place in class work. Some have opposed this theory, but it is hard to find any true or tenable ground for such objection. The love of moving to music is inborn, not alone in cultured races but in the savage and in animals.

With regard to the report issued by the Select Committee on Physical Training in Elementary Schools, the following remarks anent musical accompaniment to drill will be found :—

"It should be clearly understood that while music gives liveliness to the performance, it acts as a rhythmic stimulus, and to some extent replaces the need of effort of the will. Thus, while it saves fatigue—a very valuable thing with young children—it also detracts from the will training in muscular movements, diminishing the educational value of such movements."

We maintain that suitable music with exercise is so valuable *because* of the healthful stimulus it gives *and* the economisation of nervous force, thus diminishing the chances of fatigue. Surely if with music one gets 25 per cent. more work done with less fatigue it is a National saving? And if any section of the community be in need of a helpful, health-promoting stimulus, it is the often poorly-fed Board School children!

Class Exercises should be Recreative.

As to "detracting from will training," Lagrange, in his "Physiology of Bodily Exercise," considers it vitally important to give the (necessary) physical exercises to school-children with the very least mental effort, and they should be *recreative.*

By practice pupils learn to do movements automatically, and in the learning the will is exerted and the music is more or less ignored. This is where mentality is demanded; the real physical benefit is derived when the movements are performed automatically; then comes in the stimulating element.

Walking is often held up as *the* exercise for health. Surely the great value, hygienically, of walking is that it *is* automatic. Lagrange says: "Every walker must have noticed how fatiguing it is when we have to *choose our steps.* When we pass from a fissured and rocky path to a well-made high road, we feel great satisfaction, and the work diminishes by one-half."

It has been proved by conclusive experiment that music played to men on the march adds materially to their powers of *endurance;* sailors also chant some rhythmic doggerel with similar results.

Music, therefore, should be cultivated as an elevating art generally, and particularly as a needed mental tonic to school-children, and one of the most agreeable and hygienic educational methods is surely to combine it with physical exercises.

Physical Education and Temperance; Compulsory (National) Physical Training; Modern requirements.

In addition to the various qualities already enumerated, we assert that gymnastics produce grace and symmetry of form by an equipoise of muscular development, and concomitantly a well-balanced mind; in other words the golden virtue of temperance in its widest sense. Therefore we ask that physical education, rational and national, be compulsorily incorporated into the educational curriculum. One desires to emphasise the word "rational" because it is *health* rather than *strength* that is the great requirement of modern times; it is not the power to travel great distances, carry great burdens, lift great weights, or overcome great material obstructions; it is simply that condition of body and that amount of vital capacity, which shall enable everyone to pursue his calling in life with the greatest comfort to himself and to his fellow beings.

THE MENTAL AND PHYSICAL DEVELOPMENT OF CHILDREN.

By J. G. LEGGE,
H.M.I. Industrial and Reformatory Schools.

NEARLY everybody is now agreed on the importance of securing the means for scientific physical culture in the case of children both in town and country schools. Now, what I am afraid of is whether we are not going to an extreme in desiring that, whatever the system of physical culture a child is subjected to, it should lay great stress on making the child think as well as use its limbs and muscles, expand its chest, etc. To worry a child too much about thinking while it is at drill or at exercise seems to me as wrong as to ignore thinking altogether: they are both extremes. I think children should thoroughly enjoy drill or exercise. Drill and exercise ought to be recreative in every sense of the term; therefore, do not let us condemn an instructor or instructress because he or she is not continually fussing about changing the order of exercises so that the children shall not know what is coming next, but have to think. So, too, it is a mistake to condemn music altogether. By all means have a certain amount of music to accompany drill if the musician and instrument be available. Do not have the music going the whole time, but for certain concerted movements suitable for music introduce it, particularly in running exercises or exercises with clubs. Part of the value of well designed physical exercises lies in the rhythmic, graceful, and therefore easy, movements they encourage. Music is the audible expression of rhythm. What fun is there in dancing without music? Certain kinds of dancing are in themselves excellent forms of exercise, and the more we can get into our drill of the real human delight in dancing, the better. I must say when I visited Sweden to study the Swedish system of free gymnastics, I thought people were too deadly serious over it, and the work I saw in consequence dull in execution. Do not let us, when drilling children, pull too long a face, but occasionally broaden our expression into a smile.

Free gymnastics will train the body and help to produce mental alert-

ness if thinking be not altogether ignored, but you need apparatus if you are to produce a highly valuable moral quality, courage or nerve. Do not be too rigorous in ruling out exercises that are at all dangerous. Under proper supervision, work on apparatus is safe enough. There is always a slight danger, but that is to the good. What use is a well-trained body to a boy if he has not the pluck to jump to the ground from a wall or shelf ten feet above the ground, or to make his way with his hands along a pipe with his body dangling over a street, as a person may have to do some day to escape from fire, or to rescue another?

Then again, not enough is being done, either in town or country, in connection with our elementary schools to organise games. The line suggested by the Scottish Royal Commission on Physical Training, and also by the Physical Deterioration Committee, seems to me the right one. For the proper organisation of games voluntary assistance should be enlisted. Every school authority should associate with itself a Games Committee. To that committee might well be referred all matters connected with games or athletics, and above all, the necessary arrangements for the profitable employment of holidays and half-holidays in healthy exercise.

Several medical and other witnesses before the Physical Deterioration Committee urged that in the poorer districts of our large towns schools should be established something like Day Industrial Schools, where book-work should be supplemented by handicrafts, as in the children's workshops of Sweden, and where great attention should be given to improving the physique of children by seeing they are properly fed and afforded full opportunity for wholesome exercise.

Lastly, I welcome in the presence of our distinguished chairman at this discussion a change in the attitude of the medical profession. That great profession has done much to combat actual disease, but has, I venture to think, been too much wrapped up in the study of disease and not enough in that of health. Now it is studying and preaching prevention as better than cure, and its influence, backed by science and skill, should do even more for progress than the best intentioned efforts of enthusiastic amateurs.

DEVELOPMENT OF SCHOLARS DURING SCHOOL LIFE.

By Miss MARGARET McMILLAN.

WHEN does the school life begin and end? School life begins, legally, for the majority of children in this country, at the age of five, and ends about the age of fourteen, and so we are called upon to discuss this afternoon the changes and development which children undergo between these two ages.

Now at the age of five the human being is, in the eyes of doctors and neurologists at least, an infant, that is to say a very complex, and yet very incomplete creature. Even the amazing rapidity of growth during pre-natal life, and the ever-slackening but still rapid growth of the first five years of independent life, have not sufficed to bring him to what is, medically speaking at least, the threshold of childhood. The higher centres of the brain are still undeveloped, and the body bears, even two years later, that is to say, at the age of seven, many of the characteristics, not simply of immaturity, but of embryonic life. It is of the enormous child-head that I wish here to say a few words.

It is the seat, we know, of many strange awakenings, and even re-awakenings! touch, smell, vision, hearing, every sensation has its centre *here*. Here individual and conscious memory is born. Here, too, race-memory finds a new home and starting-point. Leaving this last out of account, as a thing too great to be treated as a detail, let us ask ourselves what awakens these new and varied powers of response? Is it the formal lesson given at school, or even at the parent's knee? No, it is the act of living which first awakens. Life itself is at first powerfully educative, and this kind of education must precede all others. So stimulating is mere waking life to a very young infant that he can bear it only for short periods. The child of five can remain awake for much longer intervals than the infant, and he makes these as stimulating, as educative, indeed as exhausting for himself as possible. He runs about, talks, touches, listens, experiments, in short looks out for stimulus and sensations

from morning till night. If we want to convince ourselves that all this movement and hunger for experience is necessary, we have only to look at the children who sit motionless or asleep all day, and seek no stimuli. They are idiots. In them there is no inner response, the brain is defective. There are cases in which the brain is not defective, but the outer stimulus is denied, or restricted. The blind, deaf girl, Laura Bridgmann, was marvellously educated, yet in her brain, great tracts of cells, which under favourable circumstances would have been active in (and added as it were their volume to) the mental life, were found, after death, undeveloped. Suppose a great musical genius, such as Mozart, had been born deaf; or a great painter, such as Turner, had been born blind; would their special powers have developed? No, nothing awakens in default of the right stimulus, and in the absence of that one mysterious order of spring-messenger that can say to it, "Awake and shine, ye that dwell in the dust!"

And your little child who runs about all day unresting, looking, talking, touching, listening; what is he doing but seeking for the myriad hands that waken him into fuller life. If you can assist him to find these, you are helping him. If you prevent him, you are injuring him—and irreparably. The most important factor in education, after good nutrition, is the provision of a *stimulating environment*, made sustainable and enjoyable to the growing creature by long, regular, and frequent intervals of sleep.

There is, then, a spring-time of the brain, and it does not recur. True the brain is such a large and complex organ that the spring of one part (like the spring of one hemisphere of the earth) is not that of another. The various areas of it do not expand and blossom all at once, but evolve gradually in succession, so that as Sir James Crichton Browne has told us in one of his essays, there are in every brain, at one and the same time, zones of budding spring, zones of luxuriant summer, and zones of more or less opulent harvest. But no centre has more than one spring, and that spring may be, and is, in many cases very short. Nevertheless, it can be lengthened. The whole problem of early education is invested, in the light of modern science, with a new seriousness. Much, nearly all indeed, is left in the hands of infant and primary teacher and parent, since the events and happenings of early years cannot be over-ruled and entirely nullified by later ones.

Roughly speaking the brain may be divided into three sections, viz.:—the sensory which is the receptacle of all the impressions poured in by the senses; the motor which is in the middle and is the fountain of all

muscular movements, intention and will; and a frontal region which is not demonstrably either sensory or motor. I should like to speak first of the middle brain, for I think that one of the gravest mistakes we have made in the past is the under-rating of the importance of the *rôle* which the motor system plays in the development of mind. Now the motor centres develop we know in a certain order. For example: The centre involved in the act of sucking is developed very early. Some control of the arm is also gained pretty early, and control of the limbs necessary for the act of walking is not often delayed beyond the end of the second year. Full control of the finer muscles of the hand involves a discipline extending over ten or twelve years, and is not gained before the end of the elementary school-life. One thing is clear, viz., that infancy and childhood are the active periods or spring-tide of the motor centres. And the question arises, how far are we justified in interfering with this exuberant development? It is certain that in the past we have interfered with it most seriously, most authoritatively, and I will also add most carelessly and ignorantly. We have taken children, beings still in that period of life when motor control is gained by constant experiment, and have compelled them to sit behind desks, to march in stiff ranks, to hold their arms in constrained attitudes, to exercise fine muscles while as yet imperfect control had been gained over the large ones, and we have persisted in this treatment for long hours every day. It is impossible that such methods should not work great mischief in the growing nervous system. That mischief may not be traced, but it is not therefore trifling. However far we follow the injured pupil he will bear the marks of this thwarting and arrest. Brain motor centres are incessantly taking an indispensable part in our mental life, and to injure them is to sap intellectual and moral energy at one of their sources.

Through restraint, then, we have modified the development of the brain. We have, that is to say, been too active, too vigilant in a sense, too aggressive. With regard to sensory training, however, our tendency has been just in the opposite direction. We have been inclined to take too much for granted, and to give too little aid. I said that a little child of three or four will run about all day looking for stimulus, and overjoyed with every new flower and colour. But this springtide of the senses does not last long. In the case of a very few it is lengthened, and for all it may be I think lengthened so that something of its vernal breath will sweep even through the bare solitudes of age. But *left to itself* a child gets used to its environment all too soon. The little rustic does not watch the flitting cloud-shadows, or mark the flow of colour in a flower

petal. He might, he would, if there was someone at hand to lengthen the time of wakening. "There are not half-a-dozen children in every thousand," says Mr. Horsfall, "who cannot gain the power of singing correctly, and of enjoying music *if they are well taught in childhood, while the nervous system can easily form habits, and have not yet formed the habit of not noting differences of sound.*" What is true of children and music is true of children and colour and form. A little training, a little stimulus from the teacher, who *sees* differences and can speak interestingly of the beautiful things within reach, and the joy of infancy lingers, the waking period is prolonged to the enrichment and expansion of all the future life. But where this sympathy and teaching is denied there is nothing so remarkable as the *completeness* with which the early promise disappears. In vain do we build art galleries for our youths and maidens, and show them specimens of fine pottery or exquisite needlework, wondering, it may be, why the skill that is in some children's hands is absent from the hands of so many men, and why grown women are so dull to things that infants are alive to. We forget that many *die* to beauty very early in life, even though nearly all had once the power to *grow* in the love and appreciation of it.

If we postpone eye and hand training entirely till the child leaves school at fourteen, we need not bestir ourselves to give it to the majority, for at that age the unused brain centres become very sluggish. There are, however, other habits and exercises than those concerned with manual work, which must be formed early if the health and well-being of the individual is to be assured. In Bradford, six years ago, the School Board decided to run the water low in the swimming baths every Friday, and allow the babies to go down, and (having washed first in slipper baths) to play and splash about in the bigger one. Now this experience was not such a simple or uneventful one for the little ones as you may at first suppose. It was, as a matter of fact, an entrance into a new world of sensation, with all the suggestions and opportunities which such an enlargement of the emotional life brings. The children improved rapidly, and in many ways; they became passionately fond of the water, and they taught us, as time went on, that, conditions being favourable, every one of them would come to love cleanliness. Later, the council took over the schools and discouraged this infant bathing and paddling in water, which seemed nonsense, I suppose, to most of the members, but in doing this they were, I believe, making a great mistake, more especially in view of the fact that they are building adult baths all over the city.

In conclusion, I should like to make one practical suggestion. The

Royal Sanitary Institute may or may not have something to say on tne teaching of art, on the spread of science, apart from hygiene and sanitation. From what I have already said you will infer that I believe it has a special message to deliver, and function to discharge, even in those outer fields of social activity. But whether you agree with me on this question or not, all of us must be as one in thinking that The Royal Sanitary Institute must be in some degree responsible for the physical education given in elementary schools to the children of the people. In this matter, at least, it ought to be a safe censor, a strong ally, an organ of vision for all the Education Committees in the country. That such expert help and guidance is wanted we have only too much evidence. The Royal Commission for Scotland reports the most lamentable lack of knowledge and discretion, evidenced even in the giving of simple drill or physical exercises to classes of school children. I will hasten on to remind you that no other exercise combines so many important sensory elements, with such thorough rhythmic and healthy exercise of the vital organs, as *swimming*. The teachers of swimming should be, in my opinion, the teachers responsible for the physical education of the young. They should be trained physiologists, who, though not able, perhaps, to diagnose every disease (they should be experts more or less on skin disease), should nevertheless have eyes trained to detect every abnormality of structure, every sign of weakness or indication of serious danger, and to interpret that writing which nature has not failed to indite on every human face and form. And these teachers should be trained: by the swimming associations? No; by The Royal Sanitary Institute. And their aim should be, not the giving of exhibitions in the water, nor even the saving of people from drowning (though that will be made possible for all the scholars), but the physical salvation of the whole race through the inculcation from infancy of good habits, formed in the love of personal purity, and fixed by the law of the social conscience.

SLEEP IN RELATION TO EDUCATION.

By CLEMENT DUKES, M.D., F.R.C.P.Lond.

ALL who are interested or concerned in education are agreed as to what life at school should be. In its ideal form, a school is a place where the young are trained for the purposes of a liberal and humanising education. Every detail is so regulated that the most perfect health is attained in mind, body, and character.

Work is sufficient and thorough, but not excessive; and the natural bent of the pupil is consulted, without the lassitude engendered by persistent monotony.

Sleep is ample, varying according to age, but sufficient for the restoration of wearied brain tissue, and for its constant growth.

Exercise is adapted to the several ages, sizes, strength, and sex of the pupils, and varied with some reference to the choice and capacity of the individual; and adequate time is allotted, and place provided, for recreation and recuperation.

Food is abundant, plain, varied, and well cooked, with ample time allowed for mastication, so as to ensure a sufficient supply necessary for work, and for growth.

But what a long way off we are from this ideal of school life, not in any particular class of school, or in any one nation, although some are head and shoulders above others in their progress as educators. The faults are manifest enough even to the uninitiated, and pervade the whole educational life of the child from the primary school, through the secondary school, and adhere to him at the university. And yet, by a little forethought, by some amount of common sense, by efficient organisation, and by the application of the knowledge of the science of life to the individual child, how easily we could approach the recognised ideal I have sketched. I should detain you too long, and weary you too much, were I to recount the wide chasms which separate us from this ideal.

I have, therefore, selected only one item for our discussion to-day. It is one, however, which is so seriously neglected, and yet is of such moment to the child in its process of education, that I make no apology for occupying your time for a few moments' thought. I refer to *brain-rest*, or the sleep which is necessary to the child for the healthy development of

the brain (the soil which the teacher has to till) for its work in the world.

In *primary schools* children of three years of age pass the same number of hours in school as those of fourteen years of age, five hours each day for five days in the week, with a break of a few moments in the morning. I am quite convinced that no teacher would be guilty of such a wrong to his own child of three years of age!

In *secondary schools* the same fate awaits him, and the child of fourteen has allotted to him the same number of hours of work as the youth of nineteen.

Were these hours of legitimate work judiciously levied, the proceeding would be unreasonable enough; but I could bring strong testimony that many, even of the younger boys, work frequently eleven hours a day, and sometimes more. And, mind you, this does not include punishments, which, with rare exceptions, are a still further addition to the regular school work, when they ought to be physical drill or physical pain. It does not seem to be realised that this undigested work with which the brain is stuffed is of as little value to the brain itself in facilitating its expansion, and in aiding the child's subsequent career in life, as undigested food is to the body; but it is nevertheless the fact.

These preliminary remarks bring us to the gist of the whole matter, that in the process of education children should be worked by scale according to age. What this scale should be I will revert to presently.

Exercise of function is not only essential to growth and development, but also to the healthy maintenance of the brain and body. In the performance of work, however, energy is expended, and finally exhausted; and this end is reached sooner in the young, who are deficient in staying power according to their age, than in those whose tissues are matured, and brain fatigue is the result.

The time is near at hand when the teacher will not only have to acquire a knowledge of the subjects he has to teach, but also an insight into the structure and functions of the brain which has to be taught. Then advertisements for teachers who are athletes will cease, and those having an acquaintance with cerebral anatomy and physiology will be demanded. Not till then will it be clearly understood that children do not, and cannot, effectively work the present number of hours required of them, but that they are injured in the attempt.

In testimony I would point out that, at the beginning of the *day*, after a night's rest; at the commencement of the *week*, after the Saturday and Sunday rest; and at the beginning of a *term*, after the rest of the

vacation, the best work is accomplished, which is acknowledged by many of the shrewdest and most thoughtful teachers. Think, too, of that great educator, Frederick Temple, second only to Thomas Arnold, who gave it as his experience "that within a fortnight or three weeks of the resumption of school, the boys who had followed their desires, and simply read when it pleased them so to do, had immeasurably surpassed those who had been studying all through the vacation." And yet schools are not content with the daily routine of work during term, commencing at 7 a.m. and continuing, with intervals, until 9 p.m.; but the unfortunate brain is pursued even into the vacations, and its daily tale exacted.

Every living tissue requires rest, for the exercise of function involves consumption of structure, and repair demands repose. If the work performed exceed the necessary period for repair, damaged structure is the result. Growing tissues require repose for replacing the result of wear and tear; and an extra supply to provide for growth and development.

And yet the same rule dogs the steps of the unfortunate child at school, as I have pointed out in relation to work, that the younger pupils are allotted the same number of hours as the seniors for sleep. What this means to children is lowered vitality, apathy, bloodlessness, diminished growth of body and brain. It renders the child an easy prey to disease, causes slight fainting attacks resembling those cases of epilepsy termed *petit-mal;* the teacher defeating his own aims into the bargain.

It is well-established that more sleep is required for the formative than for the intellectual functional activity of the nerve-centres. During the first year of the life of the infant, when about seven inches are added to its height, *i.e.*, more than double the maximum reached in the year of largest growth, and treble the amount attained during the usual years of growth, it sleeps in the first four months of its life, when fed from its natural source, about twenty out of the twenty-four hours. If we follow nature, therefore, during the years of formation and development, adequate sleep must not only be permitted, but enforced. Do not imagine for one moment that the deleterious effects of excessive hours of brain-work during school-life can be compensated by an extra amount of sleep, since Nature repudiates the attempt and will not permit a forced brain to rest; on the other hand, the more the muscles are used the more the brain will rest. Moreover, when puberty arrives, and new functions are being established, more sleep still is imperative; as is also the case in cold weather. The long hours of work demanded of the younger children, with the short time allowed for sleep, could not be continued if the scheme

were in force all the year round, as there would be no children left at school. The vacations save a complete breakdown!

I now append, in tabular form, the amount of sleep requisite during childhood and youth.

The HOURS OF WORK *and* SLEEP *adapted to the Various* AGES *of Children.*

Class of School.	Ages of Pupils.	Hours of Work per Day.	Hours of Sleep per Night.
Nursery	From 0 to ½ years	0	20
	„ ½ to 1 „	0	18
	„ 1 to 2 „	0	17
	„ 2 to 3 „	0	16
Infant School	„ 3 to 4 „	0	15
	„ 4 to 5 „	0	14
Primary School	„ 5 to 6 „	1	13½
	„ 6 to 7 „	1½	13
	„ 7 to 8 „	2	12½
	„ 8 to 9 „	2½	12
	„ 9 to 10 „	3	11½
	„ 10 to 12 „	4	11
	„ 12 to 14 „	5	10½
Secondary School	„ 14 to 16 „	6	10
	„ 16 to 18 „	7	9½
	„ 18 to 19 „	8	9
University	„ 19 to 21 „	8	8½
	„ 21 to 23 „	8	8

I earnestly conjure those who have the welfare of the young at heart, as well as the future of the race, as we all have, to weigh well the suggestions I have brought to your notice of a proportional ratio of work and sleep according to the age of the pupil. It is both unwise and unnatural to arrange suitable hours of work and sleep for the seniors in schools, to which the juniors have to conform with serious injury to their present and their future. According to Dr. Clouston there is a decreasing degree of staying power, manifest during the last thirty years, *i.e.*, since the Education Act of 1870, on the part of the brain to the extent of about 40 per cent. It is a question for us all to consider what share, if any, schools have in this terrible fact, with the excessive hours of work in the early years of childhood, and the inadequate amount of sleep during the same period of life.

PHYSICAL & MENTAL DEVELOPMENT DURING SCHOOL LIFE.

By Mrs. WOODHOUSE.

Headmistress Clapham High School.

I.—Physical Training a First Necessity in all-round Development.

Correlation of Mind and Body.

LEAVING to others with more expert knowledge the *proof* of the belief, based on psycho-physiology, in the correlation between the healthy mind and the healthy body, I will content myself with stating the opinion that the best mental development cannot be secured till physical training takes a more prominent place, so that when making our intellectual claims we shall have taken into full account that nervous organization with which the mental life is correlated, and shall have taken every means of increasing in our pupils that vitality without which intellectual efforts must inevitably fail.

Conditions under which the best Physical Development can be obtained.

The first essential is that of adequate and suitable *space* in gymnasium and playground. It is not yet, I fear, fully realised by the public, or even by educational authorities, that the best physical development can only be secured in rooms built for the purpose. If we insist on special rooms for physics and chemistry, shall we not also make proper provision for that sound physical development without which our physics and chemistry are futile.

We ought not to rest satisfied until we have provided our girls' schools with Gymnasium, Playground, and Garden. To suggest a swimming-bath may be looked upon as a counsel of perfection, but the value of swimming as an exercise, which uses almost every muscle of the body, is realised by many.

II.—Efficient Teaching: carefully trained Physical Teachers.

The second great essential is efficient teaching, and one acknowledges the excellent work of a large body of teachers who have received an enlightened training at well-known centres, and who are in possession of

posts in the leading girls' schools of the country. At the same time it must be confessed that the supply from such training institutions has not met the demand, and inadequate training has resulted in much inefficient teaching and in a poor standard of physical work.

In England we ought now to possess teachers who have undergone at least two years' adequate training; who are instructed in physiology, hygiene, and anatomy, and who by such preparation can understand and be able to carry out intelligently the directions which may be given under medical advice for remedial exercises in abnormal cases.

For the physical mistress must be more than a mere teacher of drilling and gymnastics. She must judge of the suitability of desks to special cases, test eyesight, judge of the effect of any particular clothing. She must co-operate with the medical inspectress in cases of existing or possible defects, and provide and carry through remedial measures. The physical mistress should, wherever possible, have ample time to thoroughly carry out these duties, for she is not only dealing with classes, but much of her work is individual.

Registration of Physical Teachers.

The necessary qualifications will hardly be secured in a large number of cases until *registration* of physical teachers is established. It is to be hoped that the day is not far distant when there will be a register of gymnastic, as of other teachers, that will testify to:

1. The attainment of a general standard of intellectual knowledge, tested by some approved examination.
2. Theoretical and special knowledge of the subject in question.
3. Experience in teaching in some recognised institution.

III.—Medical Inspection.

Whatever system of gymnastics be adopted, the medical inspection should precede the course of physical training, and all remedial treatment should be guided by a medical expert.

It is at present by no means unusual in many first-grade secondary girls' schools to make the first test which a pupil undergoes a physical one, based on a medical inspection by a qualified woman doctor. In fact, a physical examination should be as compulsory as the ordinary entrance examination, and, as a matter of personal experience, I have found that parents appreciate the great help this medical inspection gives a head-mistress in judging the possibilities of a new pupil. This inspection should take place in the case of pupils already in the school at the age of

eight, and in the case of new pupils, on their entry into the school. It should, I consider, be annual for pupils between the ages of eleven and fifteen, that period of most rapid growth. Re-testing should be a matter of course for pupils whose physical condition arouses the least anxiety, and their intellectual work should be determined by the results of the successive tests.

Nature of Inspection.

It should take place, if possible, in the presence of the mother, who could materially aid by information as to temperament, habits, health, etc. In cases requiring special treatment, the inspectress would never prescribe, though she would advise the parents to refer to the family doctor, or a specialist.

After Inspection Intellectual Demands can be made with more certainty.

By means of the inspection we are enabled to make intellectual demands with the security of knowledge, and if it shows a necessity for special gymnastics (such as in the case of a girl, who through overgrowth and flabbiness of muscle is threatened with curvature), we arrange that, until the right physical condition is obtained, one language instead of two shall be taken; one branch only of mathematics, with its consequent diminution of homework; and we thus secure more time for *e.g.*, gardening, that best of all exercises for girls below par. The practising of an instrument can be lessened to give more time for rest; in fact, numerous ways suggest themselves of lessening the claims on a pupil's time and strength by means of the right correlation of the intellectual and physical life, at the same time avoiding the sense of invalidism so hindering to the best mental and moral development.

Special efforts should, of course, be made in order to lose as little as possible of the general intellectual course, but it is essential that the physical training should have the first claim. Temporary intellectual loss must be accepted for the sake of the greater gain later in physical and mental vigour. The apparent sacrifice may involve that world of difference between a steady effectual progress and the delusive rapid progress in early stages, due to the feverish interest resulting from want of good balance—a false start, so liable to be followed by breakdown and disappointment.

IV.—SUITABLE CLOTHING.

In the case of younger children whose ordinary clothing resembles the usual gymnastic costume, no special difficulty presents itself; but in the case of girls of fourteen and above, whose clothing begins to be tight-fitting,

there is danger from impeded movements. The right school dress should give scope for free movement in all directions, should avoid weight and pressure round the waist, all weight hanging as far as possible from the shoulders, and the skirt should not be long.

It has been found that two longer lessons in the gymnasium in gymnastic costume have been productive of far better results than more frequent short lessons in ordinary dress.

V.—Adequate and Suitable Times for Physical Exercise.

The suitable times are the earlier rather than the later hours on the time-table—this may seem like a collision with the claims of the correlated mental development, but the exercises must be undertaken when the pupils are fresh and vigorous, otherwise the physical exercises will be more exhausting than the mental demand of school-life. The danger of violent athletic exercise immediately after prolonged mental strain has been proved over and over again by adults who have thus used up their vitality too recklessly.

For children from seven to twelve, four short morning drilling lessons and one gymnastic lesson of forty-five minutes per week should be allowed, and for older girls two full gymnastic lessons per week. For weaker children needing special attention, four short lessons per week are preferable.

These regulated physical exercises should in all cases be supplemented by games such as net-ball, fives, lacrosse, hockey, tennis, cricket, all played under supervision.

VI.—The Teaching of Hygiene as a Means of obtaining the Co-operation of Pupils.

The reasonable and desirable co-operation of the *pupil* with the teacher in the matter of physical education may be materially increased by sensible elementary teaching in the school of hygiene. Principles of healthy life should be taught to the public at large and to children at school, in order that there may be co-operation between teachers, mothers, and children on this great question of health.

May I express a hope that this beginning of our fuller realisation of our responsibilities in secondary schools will, through the awakening of the national conscience, ultimately improve the possibilities of healthy development in all primary schools; so that in all departments the educators of the nation may claim to be training up strong and efficient citizens, physically erect, graceful, and free, mentally upright, intelligent, and self-respecting.

[*This Discussion applies to the subject before the Conference on Wednesday morning, "Scholars.—Physical and Mental Development during School Life."*]

RT. HON. A. H. DYKE-ACLAND (Scarborough) said there was need of a trained set of teachers, as regards boys, who understood scientifically physical exercises, to work in neighbourhoods where children could not get either football or cricket, and schools were far removed from any playgrounds. Also, that if from the prospectuses of all schools—private, proprietary, and public—he could remove the lists of successes in examinations, he believed he would be doing the best thing he had ever yet done for education.

DR. COLLYER (Oxford), speaking from a report of an investigation made by the eminent oculist, Mr. Warr, one hundred years ago, said it was almost impossible to find cases of short sight in the twenty years during which the record was kept. Only thirty could be found among the 1,300 children attending the Military School at Chelsea, and urged that the factor which had produced the existing enormous amount of defective vision should be inquired into and removed.

DR. T. D. ACLAND (London), supporting Dr. Clement Dukes' opinion of the value of long sleep to youth, spoke of schools where boys from thirteen to fifteen years of age were kept at incessant work and play for sixteen and a quarter hours a day, and their nervous systems were allowed only the starvation quantity of seven and three-quarter hours unbroken rest; and he pointed out methods by which it was quite practicable, in large as well as in small schools, to regulate the number of sleeping hours according to the age of the boy.

CONFERENCE ON SCHOOL HYGIENE.

Wednesday Afternoon, February 6th, 1905.

SUBJECT: "**SCHOLARS.**"—"**Physical Inspection.**"

ADDRESS

By Rt. Hon. LORD REAY, G.C.S.I., G.C.I.E., LL.D., D.L., J.P.

THE point on which I wish to lay stress is that the school and the home should be considered in close and intimate relation. Our object must be, as much as possible, to prevent the home influence from counteracting the school influence. In that connection I think it is most important, for instance, that with regard to the lowest stages of elementary education in the infant school, the teachers should be in constant communication at all events with the mothers of the children, and that the mothers of the children should be taught their duties, so as to confirm the good influence of the infant school. Now here we can copy something (it is not the only direction in which we can copy) with advantage which is being done in the United States. In the United States of America there are constant meetings of the mothers of the children with the teachers, and the most harmonious relations exist between the teachers and the mothers. That aspect of the school, which I venture to call the social and domestic aspect, is as important, if not more important, than the purely pedagogic aspect of the school. That leads us at once to the question of the physique of the children. We are all agreed that it is the duty of the school authorities carefully to watch the physical development of the children. If that is to be done with any degree of efficiency, then you must take the parents into your counsel. Now, at Chicago—at the Kindergarten College of Chicago—there is a mothers' department, and the mothers are at that college trained as well as the teachers. Thousands of mothers have passed through that college, and for those who are not in Chicago, but live at a distance, there are correspondence classes. We must study the educational needs and the capacity of the children for assimilating knowledge. That is a most

important subject. It is not sufficient to give the children an amount of indiscriminate knowledge, but you have to find out what are the difficulties of the children in assimilating that knowledge. Take eyesight, take dulness of hearing: unless you pay special attention to those infirmities by giving the children in the class a proper place to meet and overcome those difficulties, you may do more harm than good. Individual peculiarities and difficulties, therefore, have to be noted and carefully watched. I call your attention to what is being done in Philadelphia. In that city there is a register kept of every child in the school—of his peculiarities, of his defects; so that when the child passes from one standard into another standard, the teacher there at once gets to know the individual characteristics of the child, and so knows how to deal with its development. Now, here I should like to lay stress on the necessity of giving to the teachers who are well trained as much latitude to impress their personality on the children as you can give them, and not to hamper them by instructions which militate against the free exercise of their judgment. I attach the greatest importance (and in the London schools it has always been observed) to the possibility of the teacher impressing his individual personality upon the children. This personal relation is more important than the passing of certain examinations, although such tests cannot be omitted. Now this consideration makes the question of the training of teachers of the utmost importance. It is possible, but very difficult, to correct the effects of early training afterwards. The organisation of training colleges, of the various subjects which should be dealt with at those training colleges, is of the utmost importance. And also the question of training the teachers so that the teachers shall be capable of directing the physical development of the children. You are aware that quite recently the Scotch Department has issued a minute, and the result of the new system will be that the training of teachers in Scotland will no longer be left to voluntary effort, but will be controlled by representative committees. It gives me great pleasure on this occasion (the first occasion on which I am publicly able to allude to that minute) to give the greatest credit, to those who hitherto have discharged the duty of training the teachers, for the way in which they have met the State, and have abandoned the field in favour of a public authority. I am happy to say that the Government have been wise enough in the new regulations to give satisfaction to all the demands which could be made by the various denominations, so that there will be guarantees for religious training as well as absolute liberty of conscience in the new colleges. The question of physical development, and of

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watching the physical development of the children in the schools, is one to which too much attention cannot be paid. If the object of education is that the child should leave school not hating the pursuit of knowledge, but brought under the influence and charm of acquiring knowledge, then you should have in the school a number of healthy children full of energy, and entering upon life not tired out by the way in which they acquired knowledge, as was too often the case in the olden days; but children who in their school life have been thoroughly interested—been driven to exercise their curiosity in all directions, and who will leave school with the desire of acquiring for themselves, by the methods which they have been taught in the school, further knowledge. That I believe to be the object which is aimed at by our best teachers; that is, I am sure, what they are trying to perform. And do not for a moment think that I am underrating the difficulties which they have to meet, especially under the present circumstances, in the poor quarters of our great towns. I believe now that the community is alive to its responsibilities, that if we can only thoroughly awaken the feeling of responsibility in the parents (and I would not shrink from punishing those parents who neglect their duty to their children) for English education there is a bright future.

PHYSICAL INSPECTION OF SCHOOL CHILDREN IN RELATION TO PUBLIC HEALTH ADMINISTRATION.

By A. K. CHALMERS, M.D., D.P.H.,
Medical Officer of Health, Glasgow.
(FELLOW).

SCOPE OF SUBJECT.

ANY approach to a complete survey of the subject of physical inspection of school children is beyond the scope of a single discussion. Using the term as including medical inspection, and regarding it from the point of view of the facts to be observed, it might reasonably be used to include not only a consideration of physical development and the presence of disease or deformity, but of the existence of defects, such as those of sight and hearing, which interpose difficulties in the path of educational advancement. Or again, our time would be well spent were we to devote it wholly to a consideration of the methods by which facts of this nature are to be collected and collated, for it is only when this has been accomplished that we shall be able to claim for the inspection of school children any definite place in the science of education. And it is here, indeed, that a question emerges which is of sufficient importance to detain us for a moment. The primary object of physical inspection is to discover the fitness or unfitness of the child for school life, and to devise means by which the degree or extent of that unfitness may be lessened. But its importance does not end, or, indeed, even begin here. For the child who is physically unfitted to benefit by educational methods, is likely in at least a similar degree to be unfit to take part in the industrial education which is to follow; and the conditions from which his unfitness for both arises are pretty certain to have become operative before his school life began. So that, while we may discuss the physical inspection of children as specially referable to the school period of life, at which for convenience it is conducted, we shall do well, I think, to keep in mind the bearing of the facts thereby disclosed on the periods of life which precede and follow it.

It is to this aspect of the question, then, that I wish to invite your attention; and I may be permitted a remark regarding the mental attitude

in which it is to be approached. We are, as it were, at the beginning of a new field of inquiry. To many of us, and I frankly include myself among the number, we seem to be at the threshold of an investigation which may in time afford a key to many of the most profound social problems which await solution. But there is all the more need to walk warily. Our ascertained data are few, and this statement is probably more true of medical data than of others. The danger is that of generalising from scattered observations, and of attempting to deal with the subject by compartments. For the conception of physical inspection of school children which I wish to convey to you is that of a national stock-taking by which the unfit shall be selected for special treatment. When the recent Inter-departmental Committee on Physical Deterioration wished to illustrate the conditions under which deterioration is produced they referred to Sir Shirley Murphy's comparison of the expectation of life in the districts of Hampstead and Southwark, to the death-rate of 49 per 1,000 obtaining in a section of the Finsbury population, to a death-rate of almost 33 per 1,000 calculated over something like one-seventh of the population of Glasgow. There is little need to emphasise the significance of these figures, or the impaired health, with resulting industrial inefficiency, which they imply.

How are we to interpret our death-rates in terms of disease which does not kill, but which impairs the usefulness of after life?

Hitherto we have considered results; now we are asked to contemplate the process by which these results are produced, in other words, the method by which the inefficient is evolved. And it is here, I think, that educational and local authorities will find a most useful field for united effort.

A certain amount of physical inefficiency must always, under present conditions, result from unavoidable disease, but this is probably a fragment only when compared with that which results from indifferent upbringing.

I purpose now submitting for your consideration certain comparisons obtained by an inspection of school children in Glasgow, with the object of asking whether they throw light on any of the contributory causes of physical inefficiency. I have purposely left out of account the record of optical defect obtained during the enquiry, but the last table suggests that, probably as we should expect, while tubercular diseases are related to the economic standard of the family, rickets is not.

Description of Tables.

(1) The children are grouped according to the size of house occupied by their parents. In this way the economic position of the family is indicated.

(2) The height, weight, state of nutrition, and mental capacity (teacher's opinion) of the children follow closely this "economic" grading.

(3) The lowest economic grade is separated from the others by a wide interval, both with regard to nutrition and mental capacity.

(4) The constituents of certain diet are stated, from information supplied by the children, and grouped as good, medium, and bad, according to the proteids and fats they contain.

(5) The weight at given ages of children living under similar conditions otherwise show an almost constant gradation, which corresponds to the quality of the diets as thus grouped.

(6) With regard to the lowest grading, it is asked whether there is in the tables a suggestion of economic waste in applying, under present conditions, the energies of a highly-trained teaching staff to the training of children who are obviously underfed.

Bearing in mind what I have said as to the danger of generalising from insufficient data, there is notwithstanding, I think, a suggestion in these figures that the inspection of school children may be applied to a furtherance of our industrial and hygienic as well as our educational interests. We are a nation of workers, but we cannot, any more than the Hebrews of old, make bricks without straw; and, if the schoolmaster finds underfeeding so closely associated with unsatisfactory educational results, it is logical to assume that some part, at least, of our industrial inefficiency has a similar origin.

Here and elsewhere, in every town indeed throughout the country, many agencies, philanthropic and otherwise, are at work in some form, providing food for children. Day refuges, poor children's dinner tables, day industrial schools, these and many others might be cited. Are they accomplishing all that is required? If the tables which I have shown you should be confirmed by further enquiry, few, I think, will be disposed to answer that they are doing so. For what do the tables suggest? That between the children who are carefully tended at home, and those who come to the free dinner table, there is interposed another class who are always underfed or badly fed; children whose midday hunger I have seen appeased by a bowl of tea, unsweetened and without milk, taken with bread without butter. Their craving for food has been satisfied, but it cannot be said that they have been fed; nevertheless, they return to school for the afternoon's lessons, and help to swell the number of those who appear in these tables as poor in physique and defective in application to their work.

To those who are familiar with the kind of household I speak of, the picture will not appear an exaggeration.

Dr. Hall, of Headingly, who has done some notable work in connection with the feeding of children, piquantly recommends the underfed child to play truant, so that he may be committed to school on a magistrate's order. The advantages are: a simpler education and three meals a day, partly at the parents' expense; with the prospect that, at the age of twelve, the boy will weigh four pounds more on an average than had he been regular in attendance at school and insufficiently fed at home.

Diet in Relation to Physique.

In Dr. Kay's table, the diet which is described as bad will appear to all of you as deficient in the fats and flesh-forming materials which the growth of childhood requires; and it is on diets such as this, and worse, that our physical inefficiency is reared. I, of course, do not mean to suggest that the question is wholly one of diet, but I scarcely think that any other factor, taken singly, is of more or even of so great importance.

To many who are considering the question, there is a growing conviction that this defect can only be remedied by some method of organised feeding; but differences of opinion at once emerge when the means by which this object is to be accomplished fall to be discussed. It is urged that indiscriminate relief afforded to a child, because he is hungry, reacts on the parents by increasing their indifference: and the history of Poor Law legislation might, I think, be quoted in support of this contention. I suggest to you, however, the danger of allowing the child meanwhile to grow up, and to begin again the vicious circle whence he sprang.

Miss Horn, of the London School Board, in discussing the question recently, in connection with the Relief Committee of Tower Street School, remarked that the majority of parents, when asked whether they could not feed their own children, were indignant at the idea that anyone should imagine that they were unable to do so. They applied for food tickets chiefly because, they said, they knew they could be had. I quote this instance, however, only because it illustrates a principle, which, I think, we shall agree upon, that any relief which is extended to the child should be made the means, at the same time, of effort to reform the conditions of his home life.

We suggest—

1. That in all communities a section of the population fails to participate in the hygienic advance of recent years, and that associated therewith is much impaired health and defective physique, which means industrial inefficiency.

2. That the limited measurements of school children, at present available, appear to indicate:

(a) That their physical development is related to an economic standard of the family-life, which may readily be expressed.

(b) That their nutrition is similarly graded, and

(c) That their mental efficiency, as estimated by the masters, falls into line with both.

3. That this lowering of the mental and physical condition of childhood tends to the production of inefficiency in the adult, from which again the vicious circle is begun.

4. That much educational energy is meanwhile mis-spent in endeavouring to educate children who are physically unfit, as evidenced by the small proportion of underfed children who reach a reasonable standard of proficiency, according to the masters' estimate.

5. That in order to assist in preventing the production of industrial inefficients, food, and by implication the organised feeding of school children in certain districts, is essential.

6. That the most reliable way of ascertaining the distribution of underfed children is by a systematic inspection of schools, in some such manner as has been described.

QUESTION OF ORGANIZED FEEDING.

Assuming that organized feeding is necessary, the following points emerge for consideration:

1. Should the organization be entirely voluntary, or should the work become a definite function of school boards, co-operating with poor law and philanthropic agencies. The committees of both Tower Street School and the Cripple Children's League, to which I have already referred, abundantly emphasize the value of associating any scheme of feeding with one of definite domestic supervision of the homes of the children. This becomes a work of education also; the work of a home mission in its most catholic sense, the object of which is the home education of the parents. The provisions of the Prevention of Cruelty to Children's Act may form a valuable adjunct.

2. Should schools be made the centre of the food supply, such as by the erection of dining halls, or can the present voluntary dinner tables be utilised for the purpose?

3. Last of all, how is the expense to be met? Is the method followed with such success at the Tower Street School in London and the Cripple Children's School in Glasgow, adaptable to all the conditions?

TABLE I.—*Comparison of School Children according to Economic Position of Family (Boys).*

Death Rate per 1,000.	Size of House in Rooms.	Mean Height in Inches.	Mean Weight in Pounds.	Stated as Percentages. State of Nutrition. Stout.	Medium	Thin.	Mental Capacity (Teachers' Estim.). Excellent	Good.	Medium.	Dull.
32·7	1	47·7	52·9	...	60·	20·	6·6	26·6	26·6	?
21·3	2	49·3	56·6	4·9	77·2	14·9	16·6	45·4	31·2	6·6
13·7	3	50·8	59·6	10·5	74·5	14·9	17·5	49·1	28·	5·2

TABLE II.—*Weight of Children in Relation to Diet (Families in two Apartments).*—(Dr. Kay.)

	GOOD.		MEDIUM.		BAD.	
BREAKFAST	Porridge and Milk and "Kitchen."		Bread and Butter.		Bread and Tea.	
DINNER	Potatoes and Meat.		Potatoes and Soup.		Bread, Butter, and Tea.	
TEA	Tea and Bread (Occasionally "Kitchen").		Bread, Butter, and "Kitchen."		Bread, Butter, and "Kitchen" thrice weekly.	
GIRLS.—	st.	lbs.	st.	lbs.	st.	lbs.
Age 6...............	3	0	...		2	4
" 7...............	3	2	...		2	5
" 8...............	3	7	3	2	...	
" 9...............	3	12	3	8	...	
" 10...............	3	12	...		3	5
" 11...............	4	4	4	10	...	
" 12...............	5	2	4	9	...	
" 14...............	5	13	4	10	...	
BOYS.—						
Age 6...............	3	1	2	6	2	0
" 7...............	3	4	3	4	...	
" 9...............	3	13	3	10	3	1
" 12...............	4	10	...		4	5
" 13...............	5	4	5	4	...	
" 14...............	5	10	5	1	4	11

TABLE III.—"*Rickets*" *and* "*Tubercular Diseases*" *in relation to House Standard.*

Number of Apartments in House.	Number of Children	"Rickets." (1)	Tuberculous. (2)
		per cent.	per cent.
1.....	84	21·5	8·3
2..................	637	23·5	5·9
3............	440	24·3	3·6
	1·161		

(1) Includes diseases of Bones not Tubercular.
(2) " tubercular affection of Glands, Bones, and Lungs.

PHYSICAL INSPECTION.

By J. KERR, M.A., M.D., D.P.H.

Medical Officer (Education), London County Council.

(FELLOW.)

IT is a comparatively modern idea that education is the duty of the State, and even now one meets people who set up objections to this measure, and want to know why they should pay rates to educate other people's children.

I do not think we need stay now to consider the question of why the State should educate its children—to teach them the conventions which a complex and highly artificial mode of existence requires is for the good of all. The aim of education is to order their lives for the benefit of themselves and their fellows; in short, to make them fit and efficient citizens. The highest aim in this life is good citizenship.

Now, the more the individual is studied, the more is it recognized that all qualities, the highest powers, the sublimest thoughts, have their existence merely as functions of nerves and muscles. The limits of perfection attainable are born in each, and are a very variable quality in direction and amount.

Each of these qualities, as depending on the functioning of definite structures, has its plastic period when great possibilities are attainable, or when, if this is neglected, other causes come into play and the chance is gone for ever. Disease is among the causes which prevents growth and development in the years before school life begins. The infancy and the home tell heavily on the school child; the school proposes, but the slum disposes. And, as we have just been showing, the condition of the school child points forward to the adult.

From the unhealthy child to a great extent develops, as Dr. Chalmers says, that portion of the population which has failed to share to any considerable extent in the advance in material wellbeing; the high death-rates in certain districts suggesting the spectre of a prevalent physical inefficiency which is twin brother to disease.

Feeding, we have been told by another writer, is the panacea for all this. Feeding will not, however, do everything, and in school the markedly ill-fed are not nearly as numerous as the popular outcry would warrant us believing.

To show how much depends on the personal idea, some half dozen years ago I personally examined 300 of the girls in practically the poorest school of one of the large towns in the north. I expected to find some awful results. Of these girls the teachers only assessed 29 per cent. as possessing good abilities; only 62 per cent. had a good mark for even superficial cleanliness of clothing; only 55 per cent. were free from vermin in the head. Judged simply by appearance, general nutrition was good in 75 per cent.; it was fair in 22 per cent., and could only be called bad in 2 per cent. The ill-nutrition that is noticed depends not simply on want of food, but on other causes too. Before this question had ever come into the newspapers, Dr. Warner spent several years in inspecting and noting the qualities of children till he had records of 100,000, and he specially notices that often thin poorly-nourished children occur in families where others are even plethoric; 73 per cent. of those he noticed as ill-nourished had also defects in development; so that ill-nutrition must often be due to deep and ancient causes in the individual life history.

The one-roomed house stands for more than poor food, it is correlated to inefficiency in body and mind, even if you take the offspring and feed them till they are big and fat and heavy, as is being done for the juvenile population in the case of the guardians every day. It is quite possible to select the workhouse-reared children in the ordinary elementary school, the child of sluggish vitality, sleek and big and sleepy and hopelessly dull.

If one may be permitted to digress a little further, it might be asked what part does alcohol play in the formation or in aiding the submergence of this mournful crowd, the beery fathers and the ginsodden mothers, many of whom were once bright and alert; no man can say; on the matter as a purely scientific question it is impossible to dogmatise, but a State shutting up of the public-houses, I think, would be as efficacious as any State feeding the children of their victims. I cannot imagine a man holding up his head as a good citizen in any society who makes his living on the profits of the sale of drink.

These are points that emphasise the wide importance of the subject of physical inspection of school children in opening up questions which rightly fall into the purview of the medical officer of health.

Touching his field, too, is the question of the prevention of infectious

diseases and of their dissemination through the agencies of schools. We are learning, after a great waste of time, that it is not by school closure that these diseases are to be controlled. The more closely the school and class and individual child can be kept under observation in school the more power is gained over the common diseases. Diphtheria is almost preventible, scarlatina is controllable, and even measles some day may be controllable through knowledge of the children in school.

But when this has been said there is still a great region, as far as England is concerned, almost unexplored.

Dr. Chalmers has said, "The primary object of physical inspection is to discover the fitness or unfitness of the child for school life;" and in practice we occasionally reverse the latter part of the definition, so that it might be said that the primary object of physical inspection is to discover the fitness of the school life for the child.

This is the narrower view of school inspection, but this is really the more immediate and valuable part of the work for the school doctor. It will be a very unfortunate day for this country if, before educational authorities have had time to understand the importance of the school doctor's work for and with the healthy child,—if before they appreciate this, school hygiene and its prospective developments are practically arrested by handing over the duties *en bloc* to the overworked medical officer of health, or if they are merely utilised as a means of affording him another assistant.

The child has to be studied in school, during work, during exercise, during play. The school work and school methods have to be studied and allowed for. The only useful definition of the school doctor's duties, which I have always taken as my working rule, is that *he shall concern himself in all the circumstances and conditions which affect or appear to affect the health of the school-children.* Much of that work is at present impossible. Some investigations require laboratory methods; the fatigue of lessons requires investigation. The teachers struggle in vain; probably half of all their work is lost; the children soon fatigue, so that they cannot preserve understanding or memory of their work; others develop automatic and unthinking habits of passing school work almost reflexly through their brains. Such work is not merely lost, it is mentally injurious.

The whole of the school work requires re-investigation. School methods will have to be re-written in accordance with physiological studies yet to be made. The first chapters will have to be written by the school doctor or the medical psychologist. Are we to go on letting

children crowd into the infant departments from three years of age onward? It is difficult to say. Small isolated baby schools or nurseries, which are the only substitutes to be suggested if children are not to come in before six, with our city populations that live in streets of one, two, or three-roomed houses, will cost such enormous amounts to establish (£100 per child) and to keep up that this item cannot be faced.

What about the sanitary crusade in great cities for cleanliness—personal cleanliness? The teachers often do not believe the amount of dirt or vermin to be found till the doctor or nurse points this out. We can and must have clean children. Personal inspection by trained nurses is as essential as by the doctor.

We require an Act of Parliament which will enable the sanitary or school authority, after a short notice, to have a child cleansed, to keep its head shaved, if its mother will not cleanse it, and some means must be found of compelling parental responsibilities to be fulfilled, or fulfilling them at the expense and to the advantage of the State, and also severely punishing the delinquent. The neglect of parental duties I hold to be an unnatural offence, in which there should be no squeamishness or sickly emotionalism about effecting compulsion. The liberty of the subject is only good when it does not involve harm to others.

Now let me rapidly review some definite suggestions as to physical inspection and the results to be obtained in educational efficiency.

During the past two years, the Royal Commission on Physical Training (Scotland), the Inter-departmental Commission on the Model Course of Physical Exercises, and the Inter-departmental Commission on Physical Deterioration have all reported strongly on the need of medical inspection of school-children. How is this to be brought about rapidly and efficiently?

I do not think much need be expected from the central authorities; but what this country needs is a medical department for the Board of Education, with medical inspectors for the whole country; possibly £10,000 a year would suffice, certainly it would not cost £20,000. Efficient medical inspection of schools could then be demanded, and only by this means will it ever be obtained.

The local authorities should for every school have a school doctor. They need not trouble about expense; they may take it that improved attendance grants will pay the cost of this service. The doctor in small districts will best be the medical officer of health.

In districts embracing over forty schools, or in towns with fifty or more schools, they should have their own school doctor; for fifty schools

in a town he will require to give at least three school sessions weekly to work in the school. It is important that he should have had, as Mr. Bernard Shaw would say, a scientific and not merely a medical training. A diploma in State medicine will be the best guarantee of such training. The demands on his time and knowledge are so great that he should not be a general practitioner; a conscientious man cannot undertake the two duties. With a sensible man who learns to know school duties and purposes, not only will the authority save money over increased attendance grants, but they will not go digging up drains, or closing schools, or pursuing the many false issues which easily arise and often are very costly; and they will further have the satisfaction of knowing that they are not only serving their day and generation, but the generation that is to come after them.

PHYSICAL INSPECTION.

By ARTHUR NEWSHOLME, M.D., F.R.C.P., D.P.H.,

Medical Officer of Health, Brighton.

(FELLOW.)

THE children represent the raw material out of which the next generation is manufactured, and it is important that not only should this material be as good as possible, but that it should be prevented from deterioration while under the control of school authorities.

It would be lamentable if during a process which is intended to produce good and efficient citizens unfavourable influences were allowed to operate in the opposite direction. That there are such influences, which to some extent cannot be avoided, is quite certain; any more than similar influences can be entirely avoided in the analogous case of aggregation of the general population in urban communities. Aggregation implies an increased probability of spread of infection, whether in towns or in schools; and an essential first point in the inspection of schools must be the application of the best means for preventing the spread of infection.

I regard prevention of infection as the prime, if not also the main function of the physical inspection of children. The community undertakes a most serious and unwarranted responsibility when it masses large numbers of children at the most susceptible period of their lives without taking every possible step to minimise the great risks which are incurred by such aggregation.

I do not think that the daily visit of a medical man—especially as has been advocated of a medical practitioner—to each school will meet this requirement. The magnitude of his task would defeat the object in view. He would, if his duty were to be thoroughly carried out, need to inspect several hundred children, or failing this could only see the children selected for him by each teacher; and the latter, however willing, would usually make a selection which would only very imperfectly meet the requirements of the case.

Infectious diseases in schools can only be combated through the proper and efficient administration of a complete system of notification of infec-

tious diseases. Each notification is the starting point for investigation of unnotified and overlooked, as well as of notified cases, and the true medical inspection of schools—so far as infectious diseases are concerned—consists in investigating the cases and the contacts with them by every means, including bacteriological, which modern science now renders available, and in arranging for the necessary periods of exclusion of the suspected children from contact with other scholars.

In my opinion the daily visit of a doctor to each school, *in re* infectious diseases, is not only unnecessary, but would be inefficient. The school doctor, whoever he be, must act on information received from the Medical Officer of Health's office, and in conjunction with the latter, and special visits for special purposes would be much more efficient than routine visits, which would inevitably tend to become perfunctory.

In connection with this point may I refer to an aspect of the question which is likely to escape observation. Elementary schools have escaped to a large extent from the examination incubus with which they were handicapped in the past. Now grants are given for average attendance, and there is serious risk that the pressure to secure high percentage attendances may, unless carefully supervised in the interests of weakly and convalescent children, do as much harm as examinations to which a smaller number of children would be subjected. This danger has been increased by the unfortunate abolition by the Board of Education of the epidemic grant, and is at the present time exceptionally great in consequence of the spasmodic effort towards economy with which local authorities have been recently seized, an effort which, when it does not subject unfit children to education, is most commendable.

The school nurse has, I think, come to stay in connection with school organization, and I am, personally, not without hope that she may gradually reduce the work of school attendance officers, which will be more efficient and less likely to do harm when directed chiefly to cases of carelessness and neglect, while cases of sickness are investigated by the school nurse. Of course, I do not suggest that the nurse should undertake medical work; but under the Medical Officer of Health's supervision she can, like a sanitary inspector, make preliminary investigations of great importance, and can do much to ensure the early detection of infectious diseases and their proper isolation.

Dr. Kerr has shown the way in London in utilizing nurses for the diminution of pediculosis and other conditions of communicable uncleanliness in school children. I regard this work as of the utmost importance, not only in preventing elementary schools from continuing to be centres

of danger for cleanly children, but also in greatly improving the health of the dirty children themselves, and in making them less prone to acute infectious diseases.

In Brighton we have had a school nurse at work for six months, and I am more than gratified with the good results of her work in improving the standard of cleanliness of the children in our elementary schools. We have carefully enforced the rule that no responsibility must be removed from the parents. Directions are sent to them as to what is necessary to cure the contagious condition; but no materials are supplied, and the responsibility for the carrying out of these instructions is entirely left to the parents.

As practical men and women we must have regard to considerations of expense; and a doctor must not be employed when a nurse or a teacher will suffice. The doctor's true function is in organizing and supervising the necessary detailed non-medical measures, and not in attending to such minutiæ as he would be expected to supervise if a regular daily visit by him were the established practice.

It is not, I think, foreign to the subject under discussion to allude to the immense unnecessary loss of life due to the attendance of children at school under the age of five years, at which age compulsory attendance begins. Measles and whooping-cough are more fatal than all the other infectious diseases put together, and as fatal diseases they are almost entirely confined to children under five. If, therefore, we could postpone attacks of these diseases until this age has been attained, the mortality from them would become very small. This could in a large measure be accomplished by excluding these children from school attendance. Doubtless occasionally even then measles or whooping cough would be brought home by older children, but it would be the difference between "retail" and "wholesale" infection, and the total result would be an enormous saving of life.

It is admitted, I believe, by all that no educational advantage accrues from school attendance at these tender ages. The only indirect advantage usually claimed is that by allowing the attendance of the babies, more regular attendance of their older sisters is secured. But in Scottish schools they secure a better education without this premature exposure of tender babies to concentrated infection; and it ought not to be impracticable, where necessary by means of small crèches or otherwise, to provide for children under five whose mothers are obliged to go out to work, and thus prevent the wholesale risks of infection to which they are now subjected. The use of these crèches should be strictly limited to the

children of mothers obliged to earn money. Parental responsibility cannot lightly be diminished without doing harm not less to the parents themselves than to their children.

Systematic physical inspection of school children appears to me to be indispensable if we are to make progress in solving the more urgent problems of poverty. I do not believe that the physical condition of children of a given class is now worse than that of the past. The public press in the last two years has contained numerous articles on this subject, but not one of them, so far as I can judge, furnishes satisfactory evidence to this effect. I venture to think there has even been improvement as compared with the past. We must set against the deteriorating tendency of urban life the improving effect of better sanitary conditions, and of cheaper and more wholesome food.

But one point is certain: the children of the poor are punier than the children of the well-to-do. That comes out clearly in all the statistics of height and weight which have been collected. There can be little doubt that this is mainly a question of clothing and food. If we are to secure a remedy for this condition, we must know the exact facts. Action on the strength of mere impressions may do more harm than good. The provision of food for school children may, by undermining the already enfeebled efforts of parents to support their children, eventually do more harm than good. We must know regarding every child whether it comes up to the average weight and height. If not, domiciliary visits are required; and if the parents are not, though able to do so, doing their duty, advice or admonition is indicated. I admit that in actual practice it is extremely difficult to secure sufficiently good evidence to prosecute neglectful parents: but it must be noted we have not hitherto had the exact data which would be furnished by quarterly weighings of each child at school.

Much can be done to help parents and encourage them in self-help, as has been shown by Miss Frere in connection with the Tower Street schools in London. The wholesale provision of free meals is not the best means of improving the physique of the school children, though such meals may be necessary in carefully-selected cases. I am strongly of opinion that private charity will always meet the needs of these cases, when the charitable public know that the free meals will only be given in instances in which the meals are really needed. I may mention our local experience in the present winter. A voluntary committee has given during the present winter nearly 33,000 breakfasts to children in the elementary schools, giving as many as 800 children at a time a breakfast of bread and milk on five days a week. It was, however, made a condition

of receipt of this charity that a preliminary investigation should be made of each case. The following table classifies the cases up to date:—

	Number.		Percentage.	
Widows and deserted wives	104	..	13	
In receipt of parish relief	16	..	2	
Parents out of work and no earnings coming into the house..	125	..	15	30
Parents out of work, but small earnings of other members of household	126	..	15	
Parents in work, but earnings insufficient	175	..	21	
Cases not recommended as needing meals when inquiry made	182	..	22	34
Parents declined the help, although children had been recommended by head teachers as cases probably needing help..	107	..	12	
	835			

Thus one-third of the recommended cases either declined or were found not to be in need of breakfasts. This clearly indicates the necessity for careful investigation at the homes of the children; for to give meals to children whose parents can supply them is calculated to diminish the self-respect and independence on which alone national character can be built up.

PHYSICAL INSPECTION.

By Mrs. MARVIN,

Late Inspector, Board of Education.

TO an inspector of schools, observant of the physical conditions of the children, medical inspection must appear, I think, a very urgent problem.

I remember the impotent indignation I felt, when I first began to inspect, on discovering the large amount of suffering existing among the children which could have been prevented by the most ordinary care and attention. I found children with eczemous eyelids, that week after week and month after month no one ever bathed; bad cases of squint, perfectly curable, that no one took to a doctor; mere cuts and scratches becoming serious because unwashed and exposed; risk of infection through carelessness in the regulations for excluding children from school precincts during an epidemic. With further experience one feels less powerless, because the remedy becomes obvious, though by no means simple; and one ceases to blame either parents or teachers because one realizes that the responsibility for this state of things rests, not with parents mainly, nor with teachers, but is largely due to the ineffective and scrappy training for the duties of home life given to the girls in the schools and after school age, and to the conditions under which the teacher is asked to do her work. But let us turn to present conditions as to medical inspection in the schools.

In no district in which I have inspected, except London, has there been any sort of medical inspection of scholars. Alike in one of the most opulent cities of the Empire, having over 100,000 children in average attendance in its elementary schools, and in one of the most uniformly poor and crowded districts of the country where there were about the same number in average attendance, medical inspection was entirely absent. So also in country districts. Just recently, in one or two parts of these districts, the first tentative steps are being taken.

Medical inspection at the charge of public monies can be justified, I think, on two grounds. If we are to prevent injury of the child by the school routine, this must be based on a knowledge of the child's physical condition, and indications of injury or fatigue must be watched for,

recognised, and interpreted aright. At present very many children are injured in health by the school routine. Moreover, we have another sort of responsibility for the physical condition of the child. We have, in the past, given girls and boys so wretchedly inadequate a training for home duties that we have not made them capable of looking after the health of their own children. Also, I would ask you to consider whether, by taking the child out of the mother's hands for the greater part of the day at so tender an age as three years, we may not probably have weakened the maternal instinct, and thereby have increased, and even caused in some cases, that parental negligence which nowadays we so loudly deplore.

I am far from wishing to relieve the mother of the responsibility and privilege of caring for the health of her own child. I would, on the contrary, throw it more entirely upon her by leaving the child in her charge until a later age, by requiring her constantly to co-operate with the school in the matter of the physical care of the child, and even by directing the medical inspection and care of the scholars largely towards the education of the parent.

We must recognise then these two sorts of responsibility of the education authority—the responsibility not to injure the child's health by the school life, either by bad building or unsuitable furniture, or by the discipline or curriculum of the school, or by preventable risks of infection; and the responsibility to take the consequences of its own defective training of the parent. The former is a permanent, the latter, we may hope, only a temporary responsibility. At present the education authority throws an over-great responsibility upon the teachers without giving them the necessary training or guidance. Let us take a few of the commonest incidents of school life to illustrate this:—The children come to school at three, babies, needing chiefly to sleep, to learn to talk and to use their limbs and senses, needing all day long most skilled and careful treatment. But they are put in charge of teachers often with no special knowledge of their physical condition, of the immaturity of the eye, and so forth; and in numbers far too great for any human being to train properly. Consequently we find a great deal of injury to the eye, and we find, too, stammering and many other indications of over-fatigue and strain upon the nerves due to school work. The long sitting and the loud and sometimes simultaneous speaking rendered necessary by the large classes also have their obvious ill-effects upon the carriage and development of the body and upon the voice.

Again, children are constantly returning to school after illness, measles, whooping cough, a bad burn, and so forth. They come in delicate, easily tired by work, easily upset by breathing exhausted air or by stooping over books. The ordinary work is too much for them, and the teacher needs

advice as to what she may expect them to do without injury, and as to how she may mitigate the strain of long sitting and confinement. But there is no one to advise her authoritatively. She has three-score children on her hands, and so, almost of necessity, the convalescents are driven along with the others. Afterwards when one inquires about the date of the appearance of some eye trouble or nervous affection, one is told: "Oh it seemed to come on after he came back from measles;" or, "He has never seemed well since he had the measles." Again, it is very common to have in the school some child showing indications of delicacy or approaching illness, anæmia, and so forth. For want of proper advice and treatment such cases often become serious. Soon after I began to inspect schools, I noticed one day in Standard III. of a girls' school, a child who appeared to me to be dying. "Oh, all she wants is a glass of milk every day," said the head mistress, "she doesn't have enough to eat at home, and they sleep too many in a room." I learnt with amazement that she was keeping up with the work of her standard, and doing all that the others did. Her sisters looked nearly as ill as herself. I tried to persuade myself that experienced teachers and managers would not have let the case go unnoticed if it had been serious, and that I must be exaggerating its gravity. But the evidence of my own eyes was too much for me, and I sent for the manager and induced him to send the child to a doctor there and then in charge of one of the teachers. For this school was exceptionally fortunate in having a manager, and one who was accessible and able to send the child to a doctor. The doctor's report was that the child was in a very advanced stage of heart disease and must never go to school again. Shortly afterwards she was dead. The child must have suffered greatly from being required to work side by side with healthy children almost to the moment of death. This result, at least, the doctor could have prevented. The teachers and manager who had not realised the need for taking unusual action in the matter would doubtless have referred the case to a doctor earlier had a regular school doctor been a familiar idea to them and easily accessible.

There are a few points connected with the medical care of the children in the schools which I want to bring before you.

And first of all I want to point out that by far the greater part of the ailments and sufferings of the children are not such as require actual medical treatment, or such as could properly be referred to a doctor. Broken chilblains, grazed knees, gatherings, for instance, do not require a medical officer's attentions. But they cause suffering and interruption of work, and often become serious if neglected. One does from time to time meet with cases where very serious results have followed upon neglect of such small details.

For all these minor matters, as well as for dressing and attendance under the orders of the doctor, a school nurse is necessary. It may seem inconsistent with what I have said, about leaving as much as possible to the mother, to propose that these things should be attended to by a nurse. But the object of getting them done by the nurse should be, I think, to teach the mother how to do them. And where the mother is hopelessly negligent, and will not do them, it is better that they should be done by a nurse than not at all. Some of the commonest children's complaints need daily attention—such as eczema of the edges of the eyelids, which needs daily bathing, both for the sake of the sufferer and of the other scholars. But children remain for months unbathed, even after messages have been sent to the mother. If a nurse would show the mother what to do, I think it would generally be done. I have known children with their eyelids apparently in a very neglected and dirty condition, but found on inquiry that their mothers were doing their best according to their lights, some treating them with tea-leaves, some with holy water, and so forth.

Liverpool has had considerable and happy experience of school nurses. I have known a nurse to have as many as a hundred cases in one morning at a school with an average attendance of about six hundred and fifty. Last year twenty-one Liverpool schools were visited by a nurse two or three times a week, and considerably over 50,000 dressings were made. It was said, at the time I was inspecting there, to be very noteworthy that the mothers did learn to take more interest in, and undertake the necessary small attentions to, their own children, in consequence of seeing it well done by the nurse. And hear what Mr. Charles Booth says on this point ("Notes on Social Influences"): "Of all the forms that charity takes, there is hardly one that is so directly successful as district nursing. It is almost true to say that wherever a nurse enters the standard of life is raised."

It is important, as it seems to me, to get the school nursing done, where possible, by district nurses, because the district nurses can follow up the cases in the homes, and it is part of their duty, and the purpose of their existence, to instruct the poor to undertake themselves the care of the sick where specialists' aid is not required. The Queen's Nurses, as you know, were founded by Queen Victoria out of part of the money collected by the women of Great Britain and Ireland to celebrate her Jubilee. They are highly trained nurses, who always work under the directions of a doctor; they were established for the purpose of nursing the sick poor in their own homes. There are throughout England and Wales already over 400 nursing associations employing Queen's Nurses;

and I suggest the co-operation of Local Education Authorities with these associations, both because of the great economy it would imply (for the nurse being employed in district work as well as school work the Education Authority would not pay for her whole time) and because I believe that by utilizing these nurses who are familiar with and required to visit the *homes* of the sick poor, the education of the mother in caring for her children's ailments would be better secured. It would also have the advantage of securing a very highly trained type of nurse for the schools, and at the same time the nurse would get some relief from school work, which is monotonous to a highly trained nurse. It has been found that parents so much appreciate the services of the school nurse that they will gladly contribute towards the expense if this is thought desirable.

But there are other problems connected with the health of the scholars. There is the fact that they sit all day, during a great many days of the year, with boots sodden with wet. The interdepartmental Committee on the Course of Physical Exercises recommends the provision of school shoes for drill. If this idea could be extended, and the children be got to keep school shoes to change on all wet days, much suffering would be saved. It is only a matter of organisation; there is no difficulty about it. It was done in all the schools I visited in Stockholm. The shoes need not (except, perhaps, in very rare cases) be provided out of public monies. Another corollary of first-rate importance is the more practical training of the teachers to understand signs of ill-health and of fatigue in the children, which are, as the report of the interdepartmental Committee on the Course of Physical Exercises puts it, "the gauge on which the experienced teacher keeps his eye in regulating the work of a class." I myself can testify to the helpfulness of such, "so to speak, clinical experience," as the report I mentioned just now recommends for inclusion in the training of teachers, for I found some hours of instruction given me at the beginning of my work by a distinguished oculist most helpful during all the time I was inspecting. I hear that in consequence of the report of the Committee some teachers have asked their local authorities to provide such training for them. It is surely upon such training that all schemes of work and all school discipline should be based. It is to this training of the teachers and education of the parents that I look as the great ameliorating influences. But I have no doubt that they need and will need to be reinforced and supplemented by a certain amount of medical guidance and of expert nursing.

NOTES OF REMARKS ON PHYSICAL INSPECTION OF CHILDREN.

By Miss K. PHILLIPS,
Superintendent of Method-Education, L.C.C.

NECESSITY for re-organisation of schools for young children, in accordance with more adequate knowledge of laws of health and physical development which obtain to-day.

1. Owing to various causes, social and economic, thousands of children, three years of age, are found in English elementary schools.
2. Education, when it concerns such young children, and also those up to seven years of age, should be mainly a physical question.

Reasons:—(1) Because infectious illnesses become peculiarly prevalent owing to assembling so many young children together, under present conditions.

(2) Because it is in these years (three to seven years of age) that growth is most rapid, and wrong conditions as to cleanliness, food, clothing, hours of work, bad positions in sitting and standing, for instance, are all-important in view of healthy development.

(3) Because during these years eyes are frequently strained, and permanently injured, by insistence on wrong kind of occupation and work.

(4) Because the whole nervous system is strained by undue stimulation when nature is asking for rest, for sleep.

(5) Because if the conditions during the most important hours of the day prevent self-adjustment, freedom, and variety of free movements of limbs, hands, fingers, eyes, that accumulation of experience cannot be made through muscular sense, and through sense organs, which *must be*, in order that knowledge *may be*.

Nature has provided for this, partly, in the "play-instinct" of all highly organised young animals.

Each of these points could be dwelt upon at length, to show that re-organisation of schools for tiny children is necessary.

In them, too frequently the actual conditions of the social environment of the children out of school are ignored. Also the conditions of healthy developing babyhood. They are organised from the point of view of the senior school, and however excellent that may be it needs considerable modification when applied to babies of three, four, and five years of age.

Owing to this, certain troubles arise on the school side of the question, which are unnecessary. Children fail to pass the examination at the given age when they should enter the senior school. They thus lose precious time which can be ill-spared in the short school life. To the health of mind and body the loss is infinitely more serious. Liability to acquire and propagate infectious disease is increased. The teachers are too much occupied with preparation of the children, from their third year, for this coming examination in their seventh, to have leisure to note signs of disease, or physical failure. Many children are stunted in mind and body. There is heaviness and awkwardness, and dulness of perception, loss of power, of self-dependence, of initiative. These are some of the results of bringing crowds of tiny children together, under conditions which must induce attention solely to the acquisition of so-called knowledge, which obliges absence of movements, except taken as drill, with silence, and absolute dependence on the word of command of the teacher in charge.

Remedies suggested:—I. Each institution should be governed by a head teacher, with numerous staff, who have had practical experience and training in real, not text-book, knowledge of the physical conditions of healthy development.

II. The second in command should be a trained nurse, a permanent member of the staff.

III. Attached to each school there should be an attendant to assist in various ways under the direction of the nurse and head teacher.

IV. All children should be examined daily as to cleanliness of person and clothing, and physical state, depending on proper amount of sleep and nutrition; signs of illness should be noted.

When occasion suggests, clothing should be removed, and the condition of the whole body noted as to cleanliness, nutrition, physical malformation, etc.

V. Parents should be communicated with. Ignorant ones taught. private meetings of homely nature, real mothers' meetings, could be conducted under tactful and scientific direction. These could be a part of the work of all infants' schools. Parents would be instructed as to the preparation and qualities of suitable food, clothing, etc.

VI. These private physical inspections of the children would be used for the detection of malformations, indications of disease, etc.

There should be periodic visits by a medical officer, when all such cases should be reported.

VII. The attendant should be particularly engaged in assisting to train the little ones in all decent personal habits. Infinite mischief results from ignoring the need of this training, which is given in all well-regulated nurseries, and by all excellent, right-thinking women of the working class. But in only too many cases the social conditions, from over-crowding, etc., are such that the little ones are only trained to evil and indecency.

VIII. Also infinite mischief results on the physical, moral, and mental side from unsuitable clothing. Little boys' clothes are too tight and indescribably dirty.

IX. The desks, seats, tables, floors, and apparatus should be more frequently cleansed and disinfected. At present they are washed two or three times during the year. The little boys' clothing is often second-hand to begin with; when removed at night it is used to help as bed covering; unlike the girls' clothes it is rarely if ever washed. The boys play in the street, they roll about in the gutters, on the pavements and road, the clothing is thus further contaminated by all that can be there picked up. In many cases pocket-handkerchiefs are unknown. These children in this contaminated clothing sit on the seats, rest arms on desks and books. Surely all that can be washed, scrubbed, and disinfected should be so treated weekly.

Results:—If the bodies were thus cared for, and parents where necessary instructed, *if* necessary *obliged* to pay proper attention to cleanliness, decency, signs of malformation, signs of malnutrition, and want of sleep, the whole life would be healthier. Schools would provide for physical inspection and care as one of its most precious opportunities. They would provide for rest (hammocks for sleep), floor space, and *time* for free movements. It would provide occupation with large, coarser work for the exercise of larger muscles, all work which gives opportunity for self-adjustment during these first years of life.

The foundations for intellectual progress would thus be placed on a sound scientific basis, instead of the semi-mediæval tradition which obtains too frequently at present.

Health would be greatly promoted generally, and infectious diseases be minimised under such conditions of vigilance and cleanliness.

The children would have time to live through the first stages of life

more completely, the next, the real school stage would be adequately prepared for, and would thus in its turn be lived through with greater completeness of purpose and success.

If children were treated on some such lines as those indicated, all those of normal development would easily pass into the senior school at the required age, about 7½ years of age, with a reasonable prospect of a profitable and successful school career.

And this would be without counting the infinite gain in the interests of health, morality, self-control.

The only possible way to make our schools that which they should be in the life of the nation, is by the road of physical inspection, on some such lines as suggested.

Our education can only prosper, can only be effective, when it is based from the first, from babyhood, on sound medical knowledge, on scientific knowledge of the laws of development of mind and body.

PHYSICAL INSPECTION OF SCHOLARS.

By Miss HELEN WILSON, M.D.

THE medical examination of pupils, important as a first step, is of no practical value unless the interest and co-operation of teachers and parents can be secured. In many cases this is gladly given, but there are very many parents and a few teachers who are profoundly indifferent both as to the necessity, and as to the results of a medical examination.

1. It has been found a great advantage to insist on the presence of the mother at the medical examination; the actual demonstration or defect of sight or hearing, enlarged tonsils or spinal curvature is more impressive than any written report, especially when combined with a few words from the doctor. Of course, this takes longer time, and it would be difficult to apply in the case of elementary schools, but a corresponding advantage might be obtained by arranging for a health visitor to call on the parents, to explain and emphasize the medical report.

2. Ambitious parents are apt to encourage over-pressure with neglect of the physical well-being of the children. Let it be understood that before a scholarship can be held, physical as well as mental fitness must be shown. Let there be a medical examination with power not only to reject, but also to postpone the holding of the scholarship till the physical condition is such that the child can make really profitable use of his opportunities. This would be considered a hardship at first, but would in the long run be an enormous benefit to all. It is a waste of public money to allot scholarships to those who are physically unfit to make use of them. Moreover, this regulation would induce ambitious parents and teachers to keep an eye on the health of all those who *try* for scholarships as well as on the winners.

[This Discussion applies to the subject before the Conference on Wednesday afternoon—"Scholars: Physical Inspection."]

MRS. DICKINSON BERRY, M.D. (London), gave an account of how far medical inspection had advanced in other countries besides our own, and she found that the position was very much what it is here—that there was no complete and definite organisation with regard to school nurses. She thought they did not

require all the specialised training required for general nursing, and that a good part of the school nurse's work should consist of visiting the children's homes. She knew by personal experience that the amount of hygienic teaching which had been implanted in the homes was really very great indeed. Mrs. Dickinson Berry also felt that it was not so much from actual poverty as from improper feeding that children suffered; and she thought that some plan by which the parents could contribute to a wholesome dinner for their children might well be carried out.

DR. LUTOSLAWSKI (Warsaw) described an excellent method of promoting cleanliness among the poorest in Warsaw, making the taking of a bath a matter of emulation and real interest to the boys themselves.

MR. SYDNEY SPOKES (London) supported Mrs. Dickinson Berry, and desired to emphasise the need for the care of the teeth, the condition of the elementary children often being worse, in this respect, than that of the Poor Law children; and stated that he had recently had the opportunity of inspecting the new arrivals to a great English public school. Out of forty-seven new scholars, of the average age of thirteen, there were only two who had sound permanent teeth.

DR. J. A. HAYWARD (Wimbledon) describing the method of inspection of schools at Wimbledon by the local doctor and the nurses working together, insisted that all inspection was useless unless the teacher took an intelligent and enlightened interest in the health question; and, although it might seem to impose fresh burdens upon them, the results of health in schools could never be attained without their help.

THE CHAIRMAN (Lord Reay) felt that the meeting had, among other subjects, laid great stress on the mal-nutrition of children of school age, and that the remedy lay in the better teaching of the laws of health to the children, that they might make the most of what materials they had. Cleanliness also could be taught. He recognised the wisdom of the London County Council in leaving more and more to the teachers, and in endeavouring to establish co-operation in all school work in place of so much competition.

MISS CURTIS (London) spoke in favour of school nurses being district nurses who were already known in the homes, and would not have to be received as strangers; and who, according to the experience of two or three medical men on her committee, could decide by experience whether an ailment was a common child's complaint, or whether it was incipient disease requiring the treatment of a medical man.

MISS HOSKYNS ABRAHALL (Bristol) pointed out that improper feeding and clothing were to be found among the boys and girls of the well-to-do, as much as amongst the primary schools.

CONFERENCE ON SCHOOL HYGIENE.

Thursday Morning, February 9th, 1905.

SUBJECT.—Schools: Building and Equipment.

ADDRESS

By SIR WILLIAM ANSON, Bart., D.C.L., M.P.,
Parliamentary Secretary Board of Education.

MAY I first of all express the pleasure and the interest which I feel in being present here to-day; and not merely the personal interest and pleasure which I shall derive from listening to the discussion which is about to take place, but because I am able by my presence here to show the importance which the Board of Education attaches to this subject of school hygiene—a matter which has been very much before us in the course of the past year, and to which I know Lord Londonderry attaches very great value as a branch of our work. The question of school hygiene has many aspects, one of which was brought very prominently before the Board by a deputation of very distinguished gentlemen of the medical profession in the course of last summer. It concerns not merely the buildings and the apparatus of a school, but the effect of the studies on the health and life of the scholars. It affects the actual physical condition in which they come to the school, and it raises questions as to how far the laws of health, in one form and another, can be profitably taught in our schools. This is a matter which has been pressed upon us very much in the course of the last few months. In this as in other matters, educational and general, we cannot always do all at once what we should like to see done. As regards the teaching of hygiene, we have to consider what, in the present state of instruction on the subject, teachers can be expected to teach, and what children can be expected to learn. And one has to bear in mind that in instructing children on these subjects, the ideas and language alike must be of the simplest possible description, in order that the teaching may be thorough, and may not be

as misleading as sometimes our instruction in the past has been, owing to the fact that we have not considered the effect of strange ideas, couched in still stranger language, upon the youthful mind. But the particular matter with which we are to deal this morning is, the importance of school buildings and of school apparatus in continuing and promoting the health of the scholars. And we are very fortunate in our anticipation of hearing the views of Sir Aston Webb on this subject, not only because of his great reputation as an architect, but because of his special experience in this matter of school buildings. I trust that what we shall hear to-day will not be only of an ideal character, that we shall hear not only what school buildings ought to be, but what under present conditions, financial and otherwise, they can be made by the local authorities and public bodies who undertake their construction. I know that the Building Rules of the Board of Education are likely to come in for criticism of one sort or another, here or elsewhere, and I shall say this in defence of them: that while some people will say that they are not sufficiently ideal, and that they do not point to the highest standards of school buildings to which we should endeavour to attain; and while other people will say that they are not sufficiently practical, and further that they suggest requirements to which the finances of the local authorities will not adapt themselves—we have endeavoured to frame workable rules for the construction of these buildings, and that we shall hope from such discussions as are about to take place here, and from others elsewhere, to learn by criticism and from the experience of others how those rules may be amended in the future and adapted from time to time to the possibilities and to the requirements of the time; because I feel very strongly, and I think that the rest of my Department also feel with me, that the Board of Education cannot do too much in the way of endeavouring to compare notes and acquire information from all those who are interested in and who take part in the work of our education, and because it is only by those means, by this constant endeavour to inform themselves of the wants and the capacities of those with whom we have to do, that we shall be able to lay down rules, to offer advice, and to give assistance to the local authorities upon whom is laid the great and responsible burden of superintending the education of the country.

SCHOOLS AND THEIR EQUIPMENT.

By SIR ASTON WEBB, R.A., F.R.I.B.A.

(FELLOW.)

WHEN invited to attend the discussion on "Schools and their Equipment," I had no idea of opening the discussion, but rather looked forward to hearing the views of educationalists and medical experts on the conditions which they consider most favourable for the education of children in our schools, in order that we architects may be able to meet them, and bring our school buildings up to the most modern hygienic standards that may be set up. For in this matter of school building, as in the case of all buildings which are in the process of fresh developments, the architect's duty is largely to put into concrete form the requirements and conditions found by experience to be necessary by those actually engaged in the difficult and responsible occupation of bringing up children. It is from this point of view, I think, that conferences of this sort may be useful; and if this discussion can show in what direction our present mode of school building can be improved upon, we architects will be grateful.

It is precisely the want of such consultation or conference that has, I think, wrecked many an educational scheme at its commencement, and it cannot, I think, be too clearly laid down that it is for the experts, medical and educational, first to lay down as clearly as they can what they consider essential, and then for the architect to show how these essentials can best be provided for in a building.

As a matter of general application, the process should be again repeated before the erection of any particular building is undertaken. From the very commencement there should, in my opinion, be at least three parties to the erection of a school, of whatever grade, if it is to be suitable to the purpose for which it is intended:

1. The promoters or governors who have to find the money.

2. The master who has to find the brains for instruction and the medical expert.

3. The architect who has to design the building.

For a satisfactory result it is essential that these three parties should work together in collaboration from the commencement. Unfortunately in practice this is rarely done, and the omission is accountable for many mistakes that are made, from which a school may never recover.

I am afraid the more usual plan is for the governing body to meet to decide on the number of pupils to be provided for, the staff to teach them, and the accommodation required. Then they acquire a site, and hold a competition amongst architects for the building; and, having selected a plan, they show it to the master for his approval. He points out the site is all wrong, and not where it is required; that the plans are arranged for a totally inadequate staff; the modern side is too small; the class rooms are too large. Throws (probably quite properly) cold water on everything. Everyone is discouraged and disheartened. A compromise is patched up which pleases no one, and the scheme starts with failure writ large upon it.

I venture to submit that the better course would be for the governing body to take the master and the architect into their confidence from the beginning—to discuss with them the numbers to be accommodated and the staff required, always bearing in mind the funds available. The head master would advise on the staff, on the numbers to be provided for, and the accommodation necessary. The architect would advise on the probable cost of the necessary buildings, and the amount of land required to erect them on, with the necessary playground.

And so by degrees an idea would be arrived at as to what was best and possible with the means at disposal. With these particulars laid down, a search would be made for a site, of the size and locality thought most advisable. After much trouble probably a site would be found, approximating to the requirements, which all would feel, if not perfect, was at least as near the requirements as was likely to be found, because they would all know the care and trouble that had been taken to select it.

The architect would then start to prepare his plans with all the feeling of responsibility arising from his having been taken into the confidence of his clients from the commencement, and being fully aware of all their aspirations and aims. But how seldom this is the case in actual practice I leave my brother architects to say. The selection of the site is of the first importance. A mistake made here can never be rectified, and all subsequent trouble and expense, however carefully expended, will be time and money thrown away.

The position of the site can only be decided upon with a knowledge of the requirements of the special school to be accommodated, but there are certain desiderata common to all school sites, large or small, which I may enumerate as follows:—

A dry soil, easily drained, with a gentle slope towards the south, and an available road for entrance on the north; which allows the buildings to have a good frontage on the road to the north, with the rooms on the south side and the playgrounds beyond.

Sun is the great healer, especially for children, and though this ideal site may not be always available, great efforts should be made to get the nearest approximation to it possible.

Then, again, the site should if possible be in a somewhat prominent position, and the building, however plain, should have something about it to suggest the nobleness of its purpose, and to impress upon the children the dignity of learning. Children are very easily impressed in such matters, little as they may be aware of it at the time.

The plainest school building may have some dignity and cheerfulness given to it without greatly adding to its cost, and it is hardly likely to add to the attractions of being taught if we shut children up in buildings with the forbidding aspects of a gaol or the doubtful allurements of an asylum; for, as a friend of mine (a bachelor) once said to me, children, he supposed, were not all idiots. I venture to think this is a question not outside our subject of hygiene. We all know in our own houses one room is found cheerful, another depressing; and children are still more susceptible to such influences.

I see that the author of one paper in this morning's proceedings gives it as his opinion that in modern schools an attractive exterior rather than a thoroughly healthy interior, has been the chief aim of school committees and their architects. I beg to differ from this opinion, for I find—and I believe all interested in building will agree with me—that while the planning of modern buildings is immensely superior to that of their predecessors, the same superiority can hardly be claimed for their design, and that the danger at the present time is to exalt the plan and neglect the elevation.

I now come to the placing of the buildings on the site, and here hygiene largely enters into the question. Under this head, I take it, the two great desiderata are, sun in all the rooms, free circulation of air round all the buildings, and aerial disconnection between the main buildings and sanitary annexes.

This means, as far as possible, a south aspect for the buildings and the avoidance of enclosed quadrangles, and, indeed, all forms of buildings

round which the air cannot easily move. The time is coming, if it has not already arrived, when it will be thought as impossible to build a school round a cloistered quad, as a few years ago it was thought impossible to do anything else.

The type of plan gradually being evolved is undoubtedly a series of detached blocks connected or not by a cloister or corridor on the ground floor; but care must be taken in a plan of this sort that the blocks are not placed too far apart, or the distances from one to the other will become unmanageable. This applies also to the sanitary annexes, for though they should be aerially disconnected from the main buildings, I can see no advantage in placing them at long distances from where they are required. Of the two largest schools I have built, one has detached open blocks, the other is entirely connected on the ground floor by covered corridors.

I have found opinions differ very much as to the effects on boys of passing frequently in the open from one building to another during the day. In most of our public schools the buildings are disconnected and isolated, the boarding houses often being some distance from the schools, the boys using no umbrellas on wet days, and rarely hats. It is a point for authoritative medical opinion, as it seriously affects a plan. I had a friend, vigorous at past eighty, which he attributed largely to being exposed in all weathers when at Christ's Hospital, often, he used to say, sitting in chapel with his hair wringing wet, which was the cause of his never being bald.

The planning and arrangement of all schools, whether boarding or day schools, should be as simple and direct as possible; the corridors should be straight, wide, and light, and the position of the principal rooms and staircases easily understood, for this all leads to ease in supervision and cleaning.

The old grammar schools chiefly consisted of one large room in which all the classes were taught, and schools of this type have been built within the last fifty years. Then it was found that children were better managed in smaller numbers and in separate rooms, and when the London School Board commenced providing London with their very remarkable series of school buildings, they consisted solely of a series of classrooms threaded on corridors; but the want of some meeting-place was felt, and so a combination of the two principles has been adopted, and we have the hall surrounded by classrooms—an arrangement economical in space, convenient for supervision, and capable of some architectural effect at small cost.

As the greatest time of the children, in a day school at any rate, is

spent in the classrooms, these are of the first importance, and, indeed, their requirements will be found to dominate the whole design of the school. First the number each is to accommodate must be distinctly laid down, the smaller the better; in secondary schools they go as low as twenty in a room, in elementary as high as double that number. In fixing the number it must be remembered the smaller the number the larger the staff required, and consequently the greater the expense of working. The number decided on, the floor area per child must then be fixed. For secondary schools the Board of Education gives 18 feet sup. per child for classrooms up to 25 scholars, and if single desks are used it cannot be less, though complaints of its being excessive have been made in some quarters. This 18 feet multiplied by the number of children gives the area of the room, which for the purpose of lighting should be rather longer than wide and 12 feet high, giving a cubic space of 216 feet for each scholar.

The lighting is another important matter; it should, of course, all be from the left, and the glass area should be one-fifth of the floor area with the heads of the windows close to the ceiling.

I have seen the suggestions of some enthusiast who would like to see classrooms finished and furnished throughout in impervious materials, the walls of glazed bricks, the floors of asphalte, and so on, and that after every class the whole of the windows should be open and the room washed down with a hose. This can hardly be necessary and would be destructive of any adornment of the room, which should not be left quite bare of pictures, etc. At the same time no precaution that tends to easy and efficient cleansing should be omitted. There should be a fireplace in each classroom, but sufficient auxiliary heat without it.

Cloakrooms are usually made far too small in day schools. In addition to the storing of clothes there should be also space for children to change their boots; these should be conveniently placed near the entrances with lavatories contiguous to, but not in the cloakrooms. In these rooms glazed brick walls and asphalte floors are better than anything; glazed partitions to divide these apartments are better than walls for easy supervision.

The sanitary annexes are also best lined with glazed bricks as they prevent scribbling.

Staircases (which may also be advantageously lined with glazed bricks) should be arranged in easy flights with 10 to 12 steps in each and be about 4 feet wide, with a central newel wall rather than balustrade and well-hole, which are apt to lead to accidents. Concrete covered with wood blocks I find noiseless, pleasant to use, and sufficiently fire-resisting.

The question of flooring generally is a difficult and important one. On the whole I am in favour of wood blocks on concrete, but they should be of the best selected wood of their kind and rift sawn, otherwise they will give trouble. Cork carpet or linoleum glued to concrete is also well spoken of, though I have, personally, no experience of these used in this way. Euobolith, a material shown in your exhibition here, is also well spoken of, and should be easily cleaned.

Where science schools and dining rooms are provided, they should be provided in detached blocks; but details of their arrangements hardly come under the subject of hygiene that we are considering to-day.

Where dormitories are provided they should be constructed much on the principle of hospital wards, and cross-ventilated by windows between the beds. Fire-places and auxiliary heat should also be provided. The dormitories should be about 22 feet wide and 12 feet high; and 800 cubic feet per boy is usually considered sufficient, though many schools have much less.

All sanitary fittings should of course be placed in detached annexes at the level of the wards, and fitted lavatory basins and baths should be also placed here, so as to keep the dormitories free of everything but the bedsteads. This adds to the initial cost of the building, but is most desirable from a sanitary point of view, and is also found a great saving in daily domestic labour.

The walls of dormitories are best distempered, and I think this the most hygienic treatment for all walls—better than paint, as it can be done yearly without serious cost.

The doors should be plain polished wood; hard wood if possible. Plain architraves with as few mouldings as possible, and hollow skirtings. Dormitory annexes should be treated like the others in every respect. Care should be taken that the air-draft is from the dormitories to the annexes and not *vice versâ*. Where the dormitories hold as many as twenty-four boys and upwards, it is convenient to place one annexe at each end of the ward, and the staircase in the centre of the side.

With regard to the materials of school buildings, dryness is the great desideratum, and no pains should be spared to obtain it. Different precautions must be taken in different places, but brick walls are easier, I think, to make waterproof than stone, and an asphalte path close round the building and paved playgrounds add greatly to the dryness of a building; a good layer of concrete over the whole site is of course essential.

With regard to the sanitary appliances of schools it is hardly necessary

to say much, not because it is not all-important, but because the general principles of good drainage are now so thoroughly understood and recognised. I would only say that to start with a good drainage system is not enough; it must be properly tested and inspected year by year, for with the best-laid schemes defects will occur and should be immediately remedied. I would have an annual certificate as to the sanitary condition of the premises posted up in every school, such certificate to cover also the water supply.

I have left the thorny subject, heating and ventilation, to the last, though it is of great importance to us, for while in sanitary matters we are ahead of other nations, in heating and ventilation some nations are ahead of us. Although this subject is more fully treated in another paper, still I would like to say a word upon it from the architect's point of view. There are three methods of heating and ventilating schools:—

1. By open fires and windows;
2. By hot water or steam pipes, with outlet and inlet ventilators; or,
3. By hot air on the extract or plenum system.

All parts of a school do not necessarily require the same treatment; for instance, the art rooms or the science rooms, which are never crowded, will not require the same treatment as the classrooms, which are usually full, and therefore, while natural ventilation may be sufficient in one case, it would not be in another.

Whatever the system adopted, it is desirable to provide fireplaces in addition, even if they are seldom or never used.

Low pressure hot water radiators placed under the windows are probably the most satisfactory way of heating schools, but other means must be found for their ventilation, and probably fresh air admitted through the radiators and extracted at the ceiling level from the opposite side of the room will be all that will be necessary, each room being kept under separate control, the objection being that the source of the fresh air supply cannot be regulated.

Warm fresh air admitted on the plenum system has been largely used in schools, is said to work well, and has many advantages. I am using it on a large scale in the building opposite. By this means you avoid all pipes and hot metal in the rooms themselves. Easy control over the temperature of the room is obtained, since the outlet and intake are easily regulated. The pressure is outward instead of inward, and the air can be changed in each room with certainty and as often as is required. The difficulties are, the keeping of the ducts clean in towns and the cost of working the fans. It is a mistake to suppose that with the plenum system

no windows may be made to open. This is not so. While the pressure is on they must be kept closed, but may be opened with advantage at any other time.

There is no doubt that no certainty of result can be obtained except by the use of some mechanical power, which is of course always to some extent costly, and apt for that reason to be set aside.

Like drainage, all ventilation arrangements should be regularly inspected and the results noted. By this means only can some definite decision be arrived at upon this much-disputed question.

The question of school hygiene must be a subject that interests all of us, whether parents, educationalists, scientists, medicals, or architects; and especially because it is one on which finality has by no means been at present arrived at, in spite of the interest taken in the subject, or the amount which has been written about it. We architects are willing and anxious to take our share of the work, and to bring our buildings up to the standard that may be required; but, although I have said little about it, I would venture to urge that hygiene, as applied to schools, is not merely a matter of cubic space and ventilation and drains, but that pleasant and æsthetic surroundings have also much to do with the health and happiness of children, and must on no account be overlooked.

NOTES UPON SCHOOL BUILDINGS.

By J. OSBORNE SMITH, F.R.I.B.A.

(FELLOW.)

SO much has been said and written of late about school buildings that it is difficult to continue the discussion without finding oneself upon familiar, well-trodden ground. On the present occasion I propose to restrict myself to the indication of a few weak points in school design, in the expectation that by discussion in this Congress a considerable improvement may be made.

Buildings can only be used to the best advantage when they are in the hands of trained teachers, who thoroughly understand the labour-saving, health-developing devices designed for their convenience and comfort.

Our business to-day is to consider these buildings in relation to the health of the human beings whose work and training are carried on within them.

There can be no question that the health of the teachers and children will be largely increased by the work now being carried on under the Acts of 1902 and 1903, to improve the "non-provided" school buildings. The large number of these buildings which are found to be structurally deficient would seem to indicate that the heads of the Education Department have been very lax in the past, or that the system of inspection has been radically wrong. Probably the backward condition of these "non-provided" school buildings is due in great measure to the fact that reports upon the structural and sanitary condition of the buildings have been made to the Education Department by inspectors appointed to examine the children, and not by persons skilled in designing and constructing school buildings.

ADAPTED BUILDINGS.

There is still much good secondary teaching done in adapted buildings, in large private houses, altered and extended to be as suitable as may be for school purposes, but the work in such buildings is carried on under

serious disadvantages, as compared with similar work in specially designed buildings.

NEW BUILDINGS.

The floor space must depend not only upon the kind of desks intended to be used, but also upon the rapidity with which the air inside the building can be changed, and the requirement that every part of the room shall be well lighted.

The experience of teachers, medical officers of health, and architects in America, on the Continent, and in this country, indicates that fifteen square feet of floor space and 200 cubic feet of air space per pupil should be the minimum provision for class-rooms in which there are adequate means for warming and ventilating. That is the minimum required for health. The Board of Education has recently fixed the floor space for secondary schools at eighteen feet, but *ten feet* continues to be the official minimum for elementary schools, and thirteen and sixteen feet (according to the kind of desk used) for the higher elementary schools.

Medical officers of health are continually urging that classes should be reduced in size, and that the air space per child should be increased. Yet it is ordained by the Education Department that the children in the elementary schools may have only *a trifle more than half the floor space and air space* given to children of similar age in the secondary schools.

Surely we may claim that as 15 feet has been shown by universal experience to be the minimum healthy floor space, 10 feet should no longer be officially recognised as sufficient.

Class-rooms for twenty-five or thirty need not be more than 12 feet high, or even less, provided the means for ventilation are suitable and sufficient. Economy in the height of rooms is more commendable than a reduction of the floor space below the acknowledged minimum healthy standard.

ASPECT AND SITE.

It is not always possible to secure the most suitable aspect for a school building in a town, owing to the limited extent of the site, the presence of high buildings near the boundaries, and other causes. Much, however, may be done by avoiding the temptation to set the building's best elevation parallel to the street regardless of the aspect, as is too often done. Sunless rooms can in most cases be avoided by judicious planning.

Teaching cannot be efficiently carried on in proximity to the incessant noise and dust arising from traffic upon a main road. The neighbourhood of factories, mills, electric light and power stations, railways, tram-lines,

and similar noisy and dusty situations, should be avoided when selecting a site for school buildings.

Playgrounds.

The playgrounds in this country compare favourably with those in the large cities of America. A larger proportion of the space than is usual should be covered in and ventilated at the top, especially for the juniors, so that most of the games could be carried on regardless of wet weather.

The surfaces of all playgrounds should be smooth without being slippery and formed of materials, such as asphalte or good granolithic cement, which do not work up into dust. The surfaces should also be compact so that nothing adheres to the boots, durable, not liable to be kicked up or worn into holes, and well drained. Gravel, cinder ashes, shingle and loose materials are unsuitable.

Sanitary Conveniences.

In elementary schools these are usually placed some distance from the school building proper in a corner of the playground, and children must pass through the open air to reach them. This arrangement is seldom found, except in this country. It has long been generally abandoned for girls' secondary schools, although in some modern schools of this type I am sorry to say it is still found.

When we recollect the low, dark, unventilated outbuildings in which mean and unsanitary fittings were placed at most of the elementary schools previous to 1870, and continued in many cases down to the present time, we must recognise that the regulation of the code which insisted that there should be considerable air space between them and the school was justifiable and necessary.

Now, however, when excellent well-designed cleanly fittings abound, and floors can be made of impervious materials, this regulation is no longer necessary. So long as these conveniences are under reasonable supervision, and are disconnected from the school proper by a well-ventilated lobby or covered way, no danger to health can arise from connecting them to the school building, and the hardship of sending children, especially juniors, out from warm class-rooms in wet and cold weather can be avoided.

Cloak-rooms.

In the recent rules for secondary schools the distance apart for the cloak hooks is fixed at 12 in., *i.e.*, double that required in elementary schools.

If 12 in. is a reasonable minimum distance for cloak hooks for the

garments of the well cared for, surely a distance of only 6 in. is insufficient for the poorer and probably much damper clothes of umbrella-less children. Moreover, the official 4 ft. gangways are too narrow, especially for the use of girls; the floor-space should be further increased to give better means of access to the clothes and space for dressing. In secondary schools still more floor-space is required for seats and boot-boxes; 6 ft. is found to be a reasonable width for these gangways, which should never be less than 5 ft. wide from centre to centre of stands. Each gangway should have an external window at one end, and all parts should be well lighted when the children are present. To ensure this it is desirable that the rooms should not be less than 9 ft. high.

A suitable position for the cloak-room is near the entrance; good discipline and a liberal allowance of scrapers and rubber mats at the entrances and near the cloak-rooms would prevent much boot dust from the outside reaching the interior of the school. Polished floors throughout the building would then be possible, except, perhaps, in the cloak-rooms and entrances, where jointless impervious floor surfaces, such as asphalte or granolithic cement would be more appropriate. The maintenance of wax polished wood floors costs no more than washing the floors with water, which softens the wood and makes it less durable.

VENTILATION.

Whatever method of ventilation is used, all schools should be designed to allow large volumes of air to pass through the buildings from side to side when the windows are open, so that all parts can be readily swept by currents of fresh external air whenever desired. Windows are perhaps the most important and permanent means of securing ventilation in all buildings for educational purposes. When the windows are suitably designed and intelligently used in connection with two or more outlet flues from the ceiling and floor level to above the roof, and there are also large open ventilating fire-grates, stoves and radiators, by which warmed fresh air is admitted to the rooms, long experience has proved that class-rooms can be reasonably, adequately and economically warmed and ventilated.

In large manufacturing cities and towns afflicted by dust or fog, windows admit, with the external air, so many of the impurities which pollute it, that there is some excuse for keeping them closed on the plea of cleanliness and good reason for making arrangements to wash the air and force it into and through the school-rooms by artificial means.

Fans and other appliances have proved very useful for crowded places, factories, etc., but the scientific adaptation of them to school buildings is

in the experimental stage at present. Improvements may reasonably be expected, in the near future, in the application of mechanical means of ventilation to large schools, which will lessen the objections now existing to many of the imperfect attempts to introduce air by machinery and close the open windows of schools. The aim of the sanitarian should rather be directed to restrict the causes which deteriorate the air of cities and large towns than to encourage the boxing up of children in a series of sealed cells and the pumping in of air specially prepared for indoor consumption.

In conclusion, I venture to ask your assistance in strengthening the weak places in school buildings, etc., to which I have ventured to direct your attention. Other points, no doubt, there are which deserve consideration, but as we must progress step by step, I have dealt with some of those only which are ripe for practical handling at the present time, namely:—

Inefficiency of adapted buildings.

Insufficient floor space in elementary schools.

Excessive size of classes.

Absence of direct sunlight in class-rooms.

Insufficient size of cloak-rooms.

Unsuitable floor surfaces.

Inconvenient access and faulty construction of sanitary conveniences.

Unintelligent use of open windows.

Defective arrangements for warming and admitting fresh air.

Inadequate extent of covered playgrounds.

Last, but not least, I emphasize the urgent necessity for the instruction of teachers in the principles of hygiene and the care of children.

SOME SUGGESTIONS FOR THE BETTER VENTILATION OF SCHOOLS.

By A. F. SOMERVILLE.

Chairman, Sanitary Committee, Somerset C.C.

PURITY of the air is, as it has been well said, the most important of all the conditions which influence health. True as is this statement with regard to adults, its truth is even more applicable to the case of children and young persons whose bodies and intellects are in course of development, and especially so when they are subjected to the unnatural conditions of school life.

We may therefore assume that the healthiness of the site of a school building, the proper ventilation and regulation of the temperature of the class-rooms, and the efficiency of the sanitary arrangements of the offices, ought to be the first consideration of those to whom the education of children is intrusted.

I turn to the code, a copy of which *every* manager of a school is presumed to possess, read, and understand, so I was informed at the Board of Education the other day, on the same principle I imagine that every Englishman is supposed to know the law of the land, and a plea of ignorance of the law is no defence. In the Introduction, which is full of most excellent precepts and advice for the proper development of the *mens sana*, and to a limited extent, too, of the *corpus sanum*, I fail to find a single reference to the subjects under discussion this morning.

In chapter III. of the code there are to be found general rules with reference to the questions of accommodation and equipment, but it seems to be left to H.M. Inspector and the "responsible officer of the local education authority" to decide whether or not the requirements of the Board of Education, with reference to these two matters, which include ventilation, heating, and sanitation, have been complied with.

Now I will ask whether, if you were building a house for your own occupation, you would be prepared to submit the question of its ventilation, heating, and sanitation to H.M. Inspector having control over the district, and the "responsible officer of the local education authority"?

If you would not do this with regard to your own house, what right has the Board of Education to intrust these important matters affecting the health of thousands of children to gentlemen, who in their own departments are no doubt experts, and fulfil their duties with ability, but have not had that training which renders them experts in matters of hygiene?

To descend, however, from generalities to details: I find that the recognized accommodation of a school may from time to time be revised by the Board of Education, but there shall in no case be less than 80 cubic feet of internal space, and 8 square feet of internal area for each unit of the number of children in average attendance for which the school is recognized.

In Miss Alice Ravenhill's most interesting report on schools in the United States of America (Journal, Sanitary Institute, Vol. XXIII., Part I.) it is pointed out that in the New York City schools the internal area or floor space for each child is 12 square feet (as compared with the minimum of 8 square feet allowed here), and in the normal schools the internal space varies from 240 to 270 cubic feet, with an internal area of 20 square feet per pupil. But there is a further important provision in these schools, that each pupil shall receive about 2,000 cubic feet of fresh air per hour. Whether or not the minimum laid down by the Board of Education, viz., 8 square feet of internal area and 80 cubic feet of internal space is sufficient, is not so material as the question of the minimum of fresh air which each child shall receive per hour.

On this point the Board is silent, and unless H.M. Inspector and the "responsible officer of the local education authority" are experts in this matter they will be well advised if they are also silent.

In Notter and Firth's work on hygiene it is stated, that if a man has 100 cubic feet of breathing space and the air is not changed for one hour, it will at the end of the hour contain 6 CO_2 per 1,000 vols. To dilute the air sufficiently to bring down the CO_2 to the requisite standard of purity, viz., 0·2 per 1,000 vols., it is necessary to introduce 3,000 cubic feet of fresh air per hour.

On the same basis, if a child requires 80 cubic feet of breathing space it should have 2,400 cubic feet of fresh air per hour.

This may be too high a standard to aim at, and it appears to be more than is considered to be necessary in American schools, but at any rate it is quite self-evident that, if purity of air is to be maintained, ventilation must be efficient.

Some people think that doors, windows, and an open fireplace are all

that is necessary; those are the people who can sit in a draught and enjoy it.

By all means let every door and window be open when the school is empty; and in the middle of summer, when the temperature of the outside air varies but little from that of the schoolroom, windows may be freely opened, but proper ventilation should be free from draughts.

I will not attempt to discuss the various methods of ventilation, nor do I think hard and fast rules as to a system can be laid down, for so much depends upon situation and surroundings.

The result obtained, however, should be the same; sufficient fresh air introduced, and, when feasible, filtered, and at a proper temperature, and at the same time the foul air extracted.

Attention should, moreover, be particularly directed to the large window space, a constant source of draughts in schools as well as in churches.

The warm air of the class-room coming into contact with the cold window becomes chilled and falls; and, when the temperature of the outside air is very low, the chilled air inside falling rapidly creates a serious draught.

In America and in other countries, where the winter is very severe, it is found necessary to have double windows. To provide our schools with double windows is neither necessary, nor for several reasons would it be desirable.

A probable remedy, in schools which are heated by hot-water pipes, might be found by placing one of the radiators underneath the window, or else by having a slit in the window sill connecting with the hot-water pipes, so that a current of hot air passes continually up the slit and against the window. To prevent dust passing up also the air might be filtered through a slide, covered with muslin, at the mouth of the slit.

In those schools where complaint is made of serious defects in ventilation, it should be possible to obtain a sample of the air, so as to ascertain the proportion of CO_2 present.

The question of ventilation and sanitation should be left to properly qualified persons, and not to H.M. Inspectors and the "responsible officer of the local education authority."

With regard to existing schools, I would deprecate any attempt to insist upon an immediate large expenditure to remedy defects, for the unfortunate ratepayer must be considered; but in many cases much improvement might be effected at a slight cost. Tobin tubes, with a sufficient length of shaft to prevent a draught, a board under the lower

sash of a window, and similar simple methods will materially assist the entrance of fresh air, and Boyle extractors on the roof aid the expulsion of foul air.

In the case of new schools to be built in the future, proper ventilation should be insisted upon, and I would further suggest that it is not sufficient to merely examine the plans, but there should also be an inspection of the site and surroundings before the proposed system of ventilation be approved of or condemned.

All schools, private as well as public, ought to be under some proper independent control. It is undesirable that this control should be in the hands of the local medical officer of health: in this matter I speak from personal experience.

Though I have not referred to the all-important question of school furniture, I consider this matter only second in importance to that of ventilation.

If one may form an opinion from a sample of new furniture lately provided by a local education authority, and since condemned, not only by H.M. Inspector, but also by every one who has seen it, one may conclude that it is hardly safe yet to leave the choice of furniture to a "responsible officer" who is not acquainted with the anatomy of a scholar's frame.

It was suggested at Glasgow that physical exercises would easily correct any evils produced by badly constructed desks and benches; most of us, however, will probably agree that prevention is better even than cure.

To conclude; let us remember that, if we desire to have healthy, well-grown children, our first care must be for the *corpus sanum*; and that the *mens sana* will only be attained if we first take care that body and brain are in a fit state to receive and digest the instruction given.

FURTHER PARTICULARS OF HYGIENIC SCHOOL FURNITURE, ETC., FIRST SEEN IN CONTINENTAL SCHOOLS.

By JAMES GRAHAM,
Inspector of Schools, West Riding County Council.

OBSERVATION has shown that the difference in heights of children of the same age may vary from 6 to 11 inches, and these differences in height and growth can only be accommodated by desks and seats the height of which may be easily changed; that is to say, desks and seats should be adjustable to the pupils' bodies, and not the bodies to the desks and seats. Investigations have shown that being seated hour after hour at a fixed desk, even where, in a rough-and-ready fashion, they have been adapted to the size of the pupils, adversely affects boys and girls—and particularly girls. This is most harmful in the case of young children, but the inconvenience is very pronounced in the case of young men and women in attendance at technical and evening classes, who have to squeeze themselves into the ordinary fixed desk provided for the older pupils of the elementary or even of the secondary school.

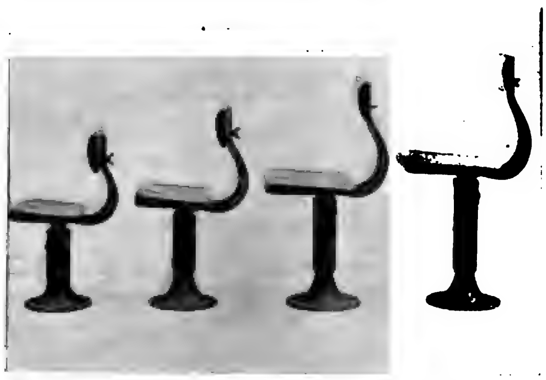
As regards the *desk* problem, the experiments in connection with the hygienic Swiss desks have produced a series of desks now regarded as satisfactory. Each desk can be readily adjusted

(*a*) To give the right height for the length of the pupil's body;
(*b*) To give the natural slope required for drawing, reading, and writing, and
(*c*) To enable pupils alternately to work sitting and standing, with the desk top quite flat, or at a slight slope, at the required height.

The facility and range of adjustment, and the accompanying rigidity at all times, are striking features as regards the desks, and the movement of the desks is generally held to be both satisfactory and simple.

3..580

As regards the *seat* problem, experiments were in progress in July last with a view to the production of a satisfactory seat, and the result of these is submitted for your inspection and criticism to-day. The seat produced is shown in four standard sizes, the heights and range of adjustment of which are as follows:—



No. 1. No. 2. No. 3. No. 4.

	Height.	From Seat to Top of Backrail.	Size of Seat.
No. 1	12″ rising to 16″	9½″ rising to 12″	11½ × 11
„ 2	14″ „ 18″	11″ „ 13½	„
„ 3	16″ „ 20″	12″ „ 14½	13½ × 12
„ 4	18″ „ 22″	13″ „ 15½	13½ × 13

(In both seat and backrail, intermediate heights to quarter inches may be obtained.)

Special attention has been given to the seat itself. It is of the chair pattern, of good size, the concavity and tilt being such that circulation is not impeded and good posture is obtained. The seats vary in width and depth, according to the size of the pupil, the inner edge being arranged to come within 1½ inches of the bend of the knee. The back rail is made so that the lower part of the body of the pupil projects beyond the shoulder line, is slightly concave, and gives support where it is most needed, viz., just under the shoulder blades. The curved iron support to the back rest permits of considerable freedom for the lower part of the body, and is also adapted for the better disposition of clothing in the case of females.

The seat support is of the pedestal type, with a circular base which fits close to the floor and thus prevents any accumulation of dust. It is

much easier for the caretaker to sweep with standards of this description.

Four heights of standards, ranging from 12 inches to 22 inches, have been made. These should ordinarily be sufficient to meet all requirements of elementary, secondary, and technical schools. The back rails in each case are also adjustable as regards height.

The method of adjustment is quite simple; everything required is fixed to the seat or back rail, loose keys being dispensed with. It may be of interest if detailed particulars of the adjustments of both desk and seat which were found necessary to meet the needs of a group of pupils are given.

The ages of the above children are 11, 12, and 13, respectively, from left to right, the boy being shorter than either girl.

No. 3.

No. 4.

No. 3 gives the taller girl seated on No. 2 seat—

Height of seat	... ...	16 inches.
From floor to top of backrail	...	28 „

No. 4 gives the boy seated on No. 2 seat—

Height of seat	... ...	15½ inches.
From floor to backrail	... ...	27 „

No. 5.

No. 5. Two boys, each 12 years of age, seated on separate adjustable seats at an adjustable dual desk—

Height of desk, 24½ inches; height of seat, 15½ inches.

The desk in this case is too high for both boys. The near boy would

No. 6.

No. 7.

require the desk about half an inch lower, while the other boy should have

it at least $1\frac{1}{2}$ inches lower still, viz., at a height of $22\frac{1}{2}$ inches. This shows the necessity, when dual desks are in use, of carefully selecting boys and girls in pairs as nearly equal in stature as may be possible. This should not be a very difficult matter, but it emphasises the need for the adoption of single desks, if satisfactory hygienic conditions are to obtain, *e.g.*, the questions of eyesight and hearing of two children of the same height should and must also be considered.

No. 6. A pupil teacher, 17 years of age, on adjustable seat at a single adjustable desk; desk set for writing.

Height of desk	$27\frac{1}{2}$ inches.
Floor to top of backrail	31 „

No. 7. Same as No. 6, but with desk-top adjusted to give the required slope for drawing and sketching.

No. 8.

No. 8. Same as Nos. 6 and 7, but working standing. Height of desk 39 inches.

No. 9. Artizan, 22 years of age, about 5 feet 10 inches in height, seated on adjustable seat at single adjustable desk, engaged in writing.

Height of seat	$18\frac{1}{2}$ inches.
„ desk	$30\frac{1}{2}$ „
Floor to top of backrail	34 „

(Note the removable sliding inkwell or colourwash block on desk top.)

Another artizan, aged 24 years, was tried in a similar position; his height was 5 feet 8 inches, and the necessary measurements were as follows:—

Height of seat	$18\frac{1}{2}$ inches.
„ desk	$27\frac{1}{2}$ „
Floor to top of backrail	$31\frac{1}{2}$ „

No. 10. Same as No. 9, but with desk top sloped for drawing, sketching, etc.

Mr. Marples, the director of the Huddersfield School of Art, when reporting recently upon the equipment of the evening schools of the West Riding for art work, wrote as follows:

> "The desks being those used by the elementary school children are usually too small for the larger boys attending the evening schools. It is difficult to suggest a remedy for this, as it is impossible to have two sets of desks in one school; the type of desk used in the elementary schools of Geneva, the height of which can be regulated at will, would completely meet the case and is worthy of consideration in the future equipment of any school."

A class-room furnished with adjustable furniture of the above type, not only meets hygienic needs, but, in addition, its value as accommodation is more than doubled because thereby it suitably meets the requirements

No. 9.

No. 10.

of a variety of subjects and pupils. Hygienic adjustable furniture, from the point of view of the health, eyesight, etc., of the pupils, is comparatively of as great importance as buildings, and should receive equal attention; yet fine buildings, carefully planned, are too often spoiled by being provided with the cheapest furniture obtainable, generally the opposite of hygienic.

Lockers for containing books, instruments, etc., are incorporated in many desks. The incorporation of a locker is an impossibility in the case of a properly adjustable hygienic desk, and the advisability of its addition to other fixed desks is very questionable. The space between the elbow and the knee (when the pupil is properly seated, with his leg vertical from the floor to the knee, and quite horizontal from the knee to the seat,

as it should be) should allow of at least a three-inch play below, between the knees and the desk, to meet minimum and maximum height of knees, and about the same amount of play is required above for lowering and raising the top of the desk to suit the minimum and maximum heights of elbows from the floor. No child or youth, when properly seated, has a space of six inches between the knee and the elbow, the minimum space is one inch and three-quarters. Only the other day, however, the headmistress of a girls' secondary school insisted on having desks with lockers six and a half inches deep, in order that the books might stand on their ends!

Lockers should be separately arranged, in cupboard fashion, alongside one of the walls of the class-room. They could thus be readily inspected at any time, and pupils would avoid having an accumulation of dust-soiled books, and sometimes rancid sweets, continually under their noses.

The movements of the above hygienic desk and seat are quite simple and free from danger; the use of a key, a screw, or of a pinion has been avoided, and with them the liability to accidents to the hands of the pupils.

The desks and seats have passed beyond the experimental stage, and are now being tested by various educational authorities. The following is a list of schools which have class-rooms furnished with the adjustable desks:

Gresham School, Holt, Norfolk	Single desk and seat combined.
Sowerby Bridge Technical Instruction Committee	Technical single desks—single desks—all wood—no seat, ordinary chair with indiarubber shields on feet.
Doncaster Educational Authority....	ditto
Wath-on-Dearne Mechanics Institute	ditto
Harrogate Technical School	ditto
Normanton Technical School	Technical single desks.
Glasgow School Board	Technical single desks—elementary dual desks.
High and Low Bishopside School Board, Pateley Bridge	Elementary dual desks.
Hebden Bridge, U. D. School Board	ditto

A school in Sydney, N.S.W., and certain government schools in Malta have recently been furnished with the adjustable desks.

SCHOOL BOOKS, AND THEIR RELATION TO THE HEALTH OF THE SCHOLAR.

By JAMES ROBERT KAYE, M.B., D.P.H., F.C.S.,

Medical Officer to the West Riding County Council.

(FELLOW.)

THE wonderful strides made during recent years in the cheap production of admirable text-books has naturally resulted in the greatly increased use of printed books in schools. Educationists and publishers are continually co-operating to meet the growing requirements and it is evident that a great improvement is being made in regard to (1) subject-matter, including illustrations; (2) cheapness; (3) serviceableness; (4) suitability of type, paper, etc..

With the first three mentioned I do not propose to deal, leaving their evolution to those more immediately concerned. But the questions of type and materials, and the hygienic treatment of books, have a bearing on the health and comfort of the scholars which, I think, also demands attention.

All reading involves muscular effort on the part of a very important and delicate set of organs, and any cause, such as indistinct printing or bad light, which increase that effort unduly, frequently leads to what is generally termed eye-strain. Especially is this so in the young, and the ultimate result is shortsightedness or myopia, which, according to recent investigations, affects scholars to the extent of about 6 per cent. It is true that this defect can often be corrected by spectacles, the use of which seems to be rapidly increasing. In many professions there is no objection whatever to the use of glasses, although myopics are specificially excluded from certain posts, and in numerous ordinary occupations the spectacled worker is not regarded with favour. Under modern conditions of employment it is becoming a serious thing for a worker to show signs of advancing age, and the wearing of spectacles does not always improve a man's chances. In any event, no one will deny that it is better to

remove the initial causes of eye-strain as far as possible rather than to attempt to correct the effects.

As to the type and printing of school books, it is evident that publishers have already experimented to some extent on this subject, but whether with scientific aim seems doubtful. In some cases there appears to be a tendency to act as though the scholars were all short-sighted, requiring a large and heavy type with thick up-strokes and ponderous down-strokes. In others, the desire for a wide expanded face and excessive lateral spacing has led to a straggling appearance not unlike that associated with typewriting, which, if it does anything, increases the strain of reading. It seems to me that, except for the younger standards, there is no necessity

28. THE DAFFODILS.

1. I wandered lonely as a cloud
That floats on high o'er vales and hills,
When all at once I saw a crowd,
A host, of golden daffodils;
Beside the lake, beneath the trees,
Fluttering and dancing in the breeze.

2. Continuous as the stars that shine
And twinkle on the milky way,
They stretched in never-ending line
Along the margin of a bay;
Ten thousand saw I at a glance,
Tossing their heads in sprightly dance.

for a special school-book style of printing, provided the impression is good and the setting complies with certain commonsense requirements. Clearness and spacing are points of possibly more importance than size. Children should have no difficulty in reading small pica or even long primer type. A small type with lines well leaded is more legible than a larger one set solid. Of course, very small type is bad, and there seems little tendency to err in that direction, although it may be permissible even to use bourgeois for those books or parts of books which are used for reference rather than for continuous reading. Samples are submitted showing the different types referred to and the effect of leading between the lines.

The ink, of course, should be of a good black (at all events until such time as it is practicable to print with white characters upon a black

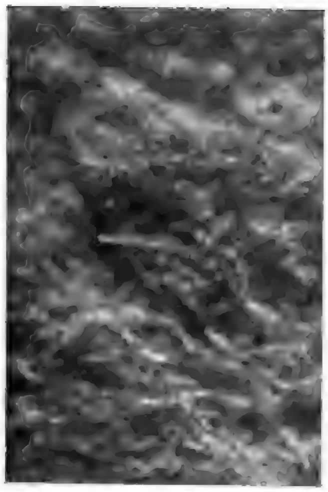
ground, when the advantage will be that only the letters will stimulate the retina instead of, as at present, allowing the large negative portion of the page to provide the stimulus).

Spacing, as has been stated, is almost more important than type. I would advocate abundant vertical spacing or leading between the lines, but I would not be too lavish with the lateral extension. Vertical spacing is advisable to relieve the tension which is necessitated in refixing the visual axes quickly and accurately upon the beginning of a line after travelling from the end of the preceding line. Horizontal spacing, on the other hand, increases the lateral motion of the eyes, which tends to muscular exhaustion and eye-strain. In reading the narrow columns of printing which are sometimes found by the side of an illustration in a magazine, we have all noticed the ease with which the eye finds the beginning of each succeeding line. That is because the vertical spacing bears a higher ratio to the length of line. But we have also in the same circumstances experienced the difficulty introduced by excessive or irregular lateral spacing.

To sum up, then, as regards type and printing, we should have black ink, clear type, well leaded vertically, but with normal lateral extension. The width of the page should not be too great, and the longer the line is the greater should be the vertical distance between the lines. From three and a half to four inches is the greatest length of line permissible, and no double column arrangement should be allowed. The page should also be well broken up into sections and paragraphs, and the type should be carefully built somewhat after the manner of masonry, so as to avoid, as far as possible, those diagonal runs of clear paper which are known as water chains, and attract the eye like cracks on the face of a building.

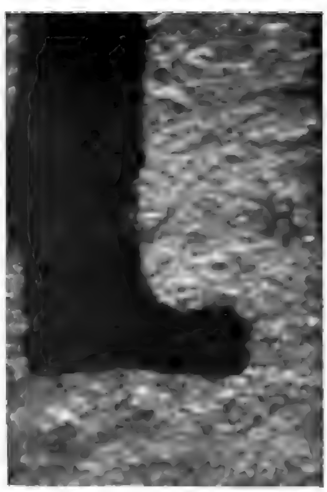
It must not be forgotten that the normal distance of a book from the eye in reading should be about twelve inches in children under nine years and sixteen inches over that age, with the book at an angle of forty to forty-five degrees in all cases.

With regard to the paper most suitable for the printing of school reading books, there seems to be here again a dearth of scientific information. It is, however, agreed that a brilliant white is not advisable, while experiments which have been made in the direction of a sea-green tint have not met with great success. The general opinion and practice is in favour of a creamy colour of sufficient thickness and opacity, capable of giving a perfect impression with good black ink. It is very unsatisfactory

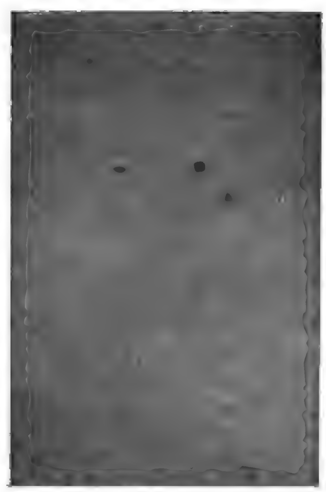


1. Hand-made writing-paper.
× 60.

2. Paper as used for school reading-books.
× 60.



3. Paper from a school-book, showing portion of print.
× 60.



4. Smooth paper as used for art illustrations.
× 60.

PICA - - - - - As to type, clearness and spacing are almost more important than size. Except in special cases there ought to be no necessity for anything larger than this.

SMALL PICA - - A smaller type, with the lines well leaded, is more legible than a larger one set solid. Abundant vertical spacing is more helpful than undue lateral expansion.

LONG PRIMER - Children should have no difficulty in reading small pica or even long primer. A type with a rounded expanded face is more legible than one with a narrow face.

BOURGEOIS - - - A very small type is of course bad for continuous or prolonged perusal; but bourgeois may be employed in books or parts of books which are needed more for reference than for regular reading.

if the printing or illustrations on the reverse side are visible through the paper.

The question of surface texture is an important one. A very glossy finish is apt to reflect the light so as to interfere with reading in some positions. Moreover, this class of paper is expensive, and is apt to crack when folded or misused. On the other hand, a dull finish often means a matt surface, which, looked at under the microscope, seems like a coarse bed of loose fibres, offering a splendid lodgment for dirt and germs of all descriptions.

This brings me to the question which has often confronted medical officers of health in their attempts to cope with the spread of infectious disease among scholars, viz., the means of disinfecting school reading-books. It is a most difficult thing to prove, even by exclusion, that school books act as vehicles of infection, yet there is a weight of probability on the side of such a view, and this is supported by the "photos" showing the surface texture of papers, and by a number of bacteriological investigations which I have recently carried out with books from an elementary school. Indeed, the possibility of infection from this source is already well recognised, and it is the practice in nearly all towns to attempt to disinfect books in times of school epidemics. Books are opened out fan-wise and exposed to the action of SO_2, or formaldehyde, in closed chambers; but probably none of those who adopt these measures are satisfied as to their efficacy. Indeed, it may be granted that the fumigation of books cannot be performed with the thoroughness which is necessary to ensure complete disinfection, and it is probable that a good dusting and exposure to sunlight in the open air would be quite as reliable. Steam disinfection is also out of the question, on account of its action on the leather and glutinous material used in the binding; while hot-air disinfection has not sufficient penetrating power. In some towns the medical officer is not satisfied with anything short of destruction; but with recurring outbreaks and valuable books one hesitates to adopt this drastic method without clear justification.

The subject is one which is well worthy of the attention of publishers, school managers, and health officers. Publishers might consider the use of non-porous smooth paper, and of covers and edges which would stand wiping with damp antiseptic cloths. School managers and health officers might arrange for the books to be kept in well-ventilated cupboards, and to be dusted and exposed to the air periodically.

If it were possible for each book to be reserved for the use of one particular scholar, that practice might provide a solution of the question of disinfection; for, coupled with a system of notification of sickness and

examination of absentees, we might have destruction of books used by infected scholars. This method too would result in greater care being taken of the books.

An alternative system, or a modification of the last-named, might be contrived whereby each scholar using a book should note therein his name and the date. This would tend to impart an idea of the value of books and the care necessary in handling them. It would also enable the books recently used by a sick scholar to be discovered and destroyed; and it might furnish valuable clues in tracing the course of a disease.

Of course there are many other points which might be dealt with in a paper concerning school books, points which must grow in importance with the increasing use of books. In visiting schools I have been much struck with the motley collection of books in use, including in their range all sizes, shapes, and types. Now that schools are in the hands of fewer authorities, would it not be possible to reduce the variety of books without reducing the variety or value of the subjects dealt with. If this were done they could be produced better and cheaper, because more of one kind would be wanted, and, moreover, the problem of dealing with the infected books of a given class or school would be materially simplified.

This suggestion of reducing the number of separate books is not made with the object of lessening the time devoted to reading, nor of narrowing the choice of reading subjects. Something might be done to relieve the increasing eye-strain by reverting frequently to the use of the blackboard, with wall diagrams, etc., and by the devotion of short intervals to nature study.

Finally, it might also be advisable that school reading books should be passed by some hygienic authority as appropriate to eyesight and health before being distributed to schools.

[*This Discussion applies to the subject before the Conference on Thursday morning—"Schools: Building and Equipment.*"

Mr. W. Whitaker (Croydon), explained the way in which he held that The Royal Sanitary Institute could play an important part in improving School Hygiene, and that they should do it because it could not be better done by any other body. It was by giving expert assistance to local and public authorities who desired to have an engineering report on an educational matter that should

be thoroughly unbiassed either from the educational or from the engineering point of view. He was glad Sir Aston Webb, as architect, had emphasised the importance of prettily designed buildings as affecting the eyesight of children, helping them to appreciate beautiful things.

MR. W. LANGBRIDGE (Bethnal Green) spoke of the welcome which teachers gave to the efforts of The Royal Sanitary Institute in endeavouring to promote health in schools, and enumerated many of the points in which a little judicious training of teachers might bring about many wholesome and commonsense reforms.

DR. G. REID (Stafford C.C.) speaking of the desirability of training children in the idea and habit of breathing fresh air for home and adult life, as well as merely school life, advocated flushing of rooms at stated intervals; and the open window as a means of ventilating schoolrooms, *always provided* the walls of the rooms were sufficiently hot to keep the rooms at the proper temperature. He also drew attention to a new plan of arranging school buildings, which would provide a verandah through which children could walk a few yards in the fresh air in passing from one schoolroom to another.

MISS RAVENHILL (London) described an excellent system of baths which she had lately visited at Amsterdam, and reported upon the improvement in the physique of the children who had for three or four years enjoyed the weekly bath.

DR. GLOVER LYON (London) emphasising the need of thorough ventilation of rooms by perflation—that is, a through draught,—pointed out that it was also needful to supply the occupants of a room with a constant gentle flow of fresh air for breathing.

DR. HAYWARD (Wimbledon) spoke of the need of reconsidering the daily posture of children in school with regard to seating accommodation, showing that the twenty minutes' drill twice a week could not remedy the defects of constant bad posture. He also pointed out how school arrangements for drinking-water were often a source of infection among thirsty children.

MISS MORRIS (West Riding C. C.) did not see how room could be made between the knees and elbows of a child to allow for any kind of a locker to the desk when the body was in the right position.

SCHOOLS—SANITARY INSPECTION.

By J. F. J. SYKES, M.D., D.Sc.,
Medical Officer of Health, St. Pancras;
President, Society of Medical Officers of Health.
(FELLOW).

WE are met together—statesmen, educationists, teachers, architects, physicians, inspectors, and others, interested directly or indirectly—to consider a widely radiating subject from an extensive circumference, all our minds converging towards one centre, but each of our perspectives differing in degree according to the point of the periphery from which we take our view.

The first consideration is very properly the scholars, or, as I should prefer to call them, children of school age. A medical officer of health must regard these children as part of the general community as well as scholars, since they pass to and from the home and school continually. Outside the school the health of the children is supervised by the parents, in case of illness the medical attendant advises, and if there be infectious disease the medical officer of health takes measures to protect the community in general and the school in particular. Theoretically, we should imagine the supervision was complete; practically, we know that it is not.

It will be seen that just as medical inspection of the *scholars* divides itself into two different functions, health inspection for the protection of the school from day to day, and physical inspection from time to time for the protection and improvement of physical and mental development, so also the medical inspection of *schools* divides itself into separate functions, consultative, experimental, and supervisory.

Consultative in regard to the site and arrangement of premises, and the planning of buildings of new schools, and the extension and adaptation of old, together with new equipment and furnishing. It is impossible to conceive that medical opinion should be excluded from the original construction and equipment, and be appealed to in the after maintenance and usage of school buildings. Architects would be only too ready to receive, assimilate, and elaborate any suggestions by medical officers that might be

offered to them in perfecting their designs, provided that the powers that be would give the proper authority enabling such suggestions to be officially given and received. This medical-consultative or advisory function applies to that portion of this day's subject, school premises, taken this morning, under the heading of Building and Equipment, and must be based upon the experimental and supervisory functions subsequently exercised over school buildings and equipment, from which the experience of the proper forms of new and original construction and equipment must be derived, and *vice versâ*. Without a thorough knowledge of the building and equipment of schools, sanitary inspection can only be a perfunctory obligation of very limited extent.

It is unfortunate, but only too true, that the term sanitary inspection is limited in the mind not only of the general public, but also of municipal councillors and even of statesmen, to the inspection of drains, as if this were the be all and end all of sanitation. Never did such an idea cling more tenaciously or obstruct more effectually the true progress of preventive medicine as applied to the buildings of domestic, scholastic, and industrial premises. The term sanitary inspection alone does not convey a sufficient idea of the experimental and supervisory functions necessary to control the health conditions of existing school-buildings and equipment. Two forms of inspection are required, and although they imperceptibly blend one with the other, yet they may be approximately defined as hygienic inspection and sanitary inspection, and I interpret the intention to be that we should consider *hygienic* AND *sanitary inspection*. Under the head of hygienic inspection may be classed the examination, testing, experimenting upon, and investigating physically, chemically, and biologically, where such processes are severally applicable, the light (natural and artificial), the temperature, the moisture, the air currents, the quantity and quality of the air and dust, and the means and effects of lighting, warming, and ventilating, and generally such matters of construction and equipment as require scientific processes and observation for their proper examination. Under the head of sanitary inspection would be placed the rougher examination of cubic space, air supply, water supply, drainage, refuse removal, cleansing, and the abatement of nuisances, including also that of the proper usage of the various parts of the buildings and appliances.

By the Factory and Workshop Act of 1901, sec. 132, it is provided that "the medical officer of health of every district council shall, in his annual report to them, report specifically on the administration of this Act in workshops and work-places, and he shall send a copy of his annual

report, or so much of it as deals with this subject, to the Secretary of State," that is, to the Home Office, a Department of State independently advised by expert medical opinion. The Education Department could well follow a precedent that has produced such excellent results within such a short period, and appoint a medical adviser to the Board of Education to whom reports upon the medical aspects of the Education Acts could be referred, and enlist medical officers of health in the service of the department.

At a meeting on 14th November, 1902, the Incorporated Society of Medical Officers of Health passed a resolution containing eight recommendations in reference to the sanitary control of schools. The resolution was, "that the Parliamentary Committee be requested to make immediate representations to the parliamentary heads of the Board of Education and Local Government Board, that in the opinion of this society"; and here follow the eight recommendations which I take the liberty to transpose in order to place them in three categories:—(*a*) relating to scholars; (*b*) to schools; and (*c*) to both.

(*a*) SCHOLARS.

1. That school teachers should be instructed to notify to the medical officer of health the occurrence of cases of alleged or of suspected infectious disease, and to furnish such other information as may be reasonably required by a sanitary authority. That it should further be obligatory on school teachers to carry out the requirements of the medical officer of health as to the exclusion of suspected cases of infectious illness, subject to an appeal to the Board of Education.

2. That the medical officer of health, or a medical practitioner acting under him, should be given power of entry and power to examine scholars on the same lines as laid down in the Eccles Corporation Act. (This applies primarily to examination for the purpose of discovering infectious and other communicable diseases, that is, *health inspection*, but also extends to examination of the condition of the organs of sense and of the physique, that is, *physical inspection.*)

(*b*) SCHOOLS.

3. That the hygienic control of public elementary and of other public schools should devolve on the medical officer of health of the district. (This is intended to embrace both *hygienic inspection* and *sanitary inspection.*)

4. That the standard of cubic space in all schools should be raised to the maximum at present existing.

5. That a standard of purity of air in schools would be of great assistance.

6. That schools claiming grants should be required to produce a detailed report from the medical officer of health as to their sanitary condition on a form to be approved, showing that they are in a sanitary condition. (This is intended to embrace both hygienic and sanitary conditions.)

(*c*) SCHOLARS AND SCHOOLS.

7. That the medical officer of health should be required to record the action taken by his department in regard to schools, and to forward annually to the Board of Education such portions of his report as relate to this subject.

8. That the Board of Education should secure a skilled medical advisor to co-ordinate the sanitary regulations of schools, and to organise a code of preventive measures applicable to schools.

The Royal Sanitary Institute, for the purpose of its examination in hygiene in its bearing on school life, has elaborated a syllabus, the first part of which embraces "personal hygiene including physiology," and the second part, "hygiene of schools." This latter part sets out fairly fully what a school teacher will be required to know in regard to the hygiene and sanitation of schools, and presumably may be taken as part of the syllabus for discussion this afternoon. It is sufficiently condensed for me to ask for your indulgence whilst I quote it for our guidance:—

Site.—Nature of soil and sub-soil; altitude, aspect, and prospect.

General arrangement.—Grouping of the rooms, cloak-rooms, play-grounds.

Water.—Storage and distribution, filters, drinking vessels.

Drainage.—Arrangement of surface and of soil drains; disconnection and ventilation.

Sanitary appliances.—Lavatories and water-closets, their position and structure.

House refuse.—Suitable receptacles and frequency of removal.

Air.—Purity and causes of its deterioration.

Ventilation.—Floor space, cubic space, impurities caused by respiration, supply of fresh air, methods of ventilation.

Warming.—Radiation, conduction, convection, open fireplaces, stoves, hot-water pipes, other methods of heating.

Lighting.—Natural, size and position of windows; artificial, nature and effects of lights, arrangement of lights.

Seats and desks.—In relation to posture and management, platforms.

Books.—Printing, type, blackboards, slates, pencils, sponges.

Decoration.—Appropriate materials and colours, cleaning.

We now see that the hygienic and sanitary inspection of schools, embraces, firstly, the original building and furnishing and subsequent alterations and improvements; secondly, maintenance for the prevention of dilapidations and defects; and thirdly, the abatement of nuisances. Sanitary inspection, in its crude sense, is usually associated with the idea of the abatement of nuisances, but a school that has reached the condition of requiring the abatement of a nuisance would lead to the assumption that there had been neglect in the maintenance of proper hygienic conditions. Such a form of neglect on such premises should not be allowed to take place. *Curative sanitation* should not be required in properly regulated schools, where *preventive sanitation* should be the watchword, and periodical inspection the method of prevention.

I have been accustomed to mentally picture four degrees or standards of sanitation, firstly, the abatement of general nuisances; secondly, the abatement of statutory nuisances or those acts or conditions which the law defines as potential nuisances; thirdly, the standard of maintenance or construction required by bye-laws, regulations, or codes; and fourthly, the ideal standard revealed to us by physiology, and by physical, chemical or bacteriological experiment and observation. These stages are the stages of education that we elders have to go through, just as our children go through their stages of education. We are all still scholars at all ages.

It comes to this then, that for the *sanitary inspection* of schools in its limited sense, regular periodical inspection of schools is required; but for the *hygienic inspection* of schools a much more careful and elaborately devised method is necessary. The former is comparatively simple and may be carried out by an intelligent sanitary inspector; the latter requires the skill of a highly-trained medical officer assisted by the physical, chemical, and bacteriological methods at his command, and the co-operation of those associated with him.

In opening this discussion I have refrained from spending the short time at my disposal in dwelling upon any one or more of the details of school hygiene and sanitation, but have ventured to clear the ground and to lay the basis of the subject upon broad foundations with the object rather of giving to others the opportunity of elaborating the details upon lines that I trust will meet with your approval.

RESPONSIBILITIES OF LOCAL EDUCATION AUTHORITIES

In connection with
Sanitary Inspection and Control of Schools.

By Miss EDITH M. EVANS.

(ASSOCIATE).

THERE is no denying the fact that if the conditions of schools now all worked by one authority in a locality are to be uniformly improved and maintained, a new official must be appointed; and as that official's duties touch both health and education, it seems a point of discussion as to whose servant he or she shall be.

Properly qualified inspectors can only be made by careful training, and there will always be the danger of such inspectors becoming too official, and thus losing touch with the teachers.

Teachers are already heavily weighted with responsibilities, but they must be made to realise that, though their effective administration may be aided by efficient inspectors, actual daily care in providing fresh air, inculcating cleanliness, and teaching the children to use all sanitary appliances with cleanly decency, is a responsibility which cannot be shifted to other people's shoulders.

The teachers suffer considerably from the casual and often inefficient services of the school caretaker. As a class these people require very careful supervision, and great care should be taken in their selection. No person should be considered eligible for such a situation who does not understand the primary law of personal cleanliness and recognized methods of cleaning. In speaking of sanitation in schools, one thinks of it always as education from a fundamental point of view, and puts in, therefore, a strong claim for the best and simplest apparatus, whether in lavatories or other sanitary conveniences. Our children are the future tenants of dwellings superior to those of their fathers if the solving of the housing problem means anything, and we are bound to teach them to live cleaner, and make better use of their opportunities.

People who have seen much of school buildings know that they are

very unequal. There has been extravagance in buildings and apparatus in some parts of the country, whilst in others the common needs of our girls, boys, and teachers have been little better attended to than the animals on old-fashioned farm property.

If we wish to see cottage and artisan property better kept in the future, we must set the standard of cleanliness and decency higher amongst the children of to-day, and as five hours of their working day are spent in school, there are great possibilities given to form lasting decent physical habits and cleanly mental impressions.

Teachers desirous of inculcating such habits will welcome a qualified inspector who can at once detect unwholesome atmosphere, badly-lighted rooms, uncleanly walls, windows and floors, unsuitable desks, defective and ill-kept sanitary conveniences; and can, by means of reporting, teaching, and acting as responsible medium between authorities, managers, teachers, and caretakers, effect a reformation which will lead to real improvement in child-health and child-training.

The responsibilities of local education authorities are therefore the heavier, in that they are or will be responsible for the appointment of inspectors who shall be capable of so improving the ventilation and cleanliness of schools and their premises, that all authorities may be able to offer mutual congratulations on the decrease of filth-disease amongst children, and a consequent improvement in general public health.

Unfortunately, however, the authorities themselves need stimulating and educating, and all corporate bodies, which have now such an immense power in their hands, should exert their influence to introduce co-opted members who, though not teachers, are educational experts, or have made special study of certain branches of educational work.

Two points should be considered by all local authorities: (1) to co-opt members for personal ability and knowledge, not for reasons too often considered in municipalities and County Councils (such as political proclivities and religious opinions); (2) wherever the area and the population are large and, consequently, difficult to work, to avail themselves of their power to co-opt more than two women to their educational committee.

THE INSPECTION OF SCHOOLS.

By H. MEREDITH RICHARDS, M.D., D.P.H.,
Medical Officer of Health, Croydon; Medical Adviser, Croydon Education Committee.
(FELLOW).

ABSTRACT.

THE necessity for the inspection of schools requires emphasizing on account of the fact that while workshops, factories, common lodging houses and many other buildings are by statute subject to inspection, no one in particular is directly responsible for the sanitary condition of schools.

The Board of Education certainly takes very little interest in the matter. Indeed, I have heard it stated that they neither assume nor desire to assume any responsibility for the sanitary condition of school buildings or the health of the children. Nor is that to be wondered at when one recalls the fact that the English Board of Education, though responsible for the compulsory attendance at school of some six million children, is absolutely without expert assistance where problems of health and sanitation are concerned. They appear indeed to resemble a certain country parson, who, when advised to have the vicarage drains and water supply examined, preferred "to leave all these matters to Providence" and hope for the best.

The Board does, however, attempt to make H. M. Inspectors answerable for the conditions of elementary schools. Article 18 of the present code enacts:

"As a condition of retaining a school on the list of schools in receipt of Annual Grant, the Board may, from time to time, require such alterations as may, in their opinion, be necessary to secure that the premises shall be safe in case of fire, shall have suitable and sufficient sanitary and cloak-room accommodation for the scholars in attendance, shall be capable of being properly lighted, warmed, drained, and ventilated, and shall be adequate and suitably arranged for the instruction of the children in attendance according to their age.

"The recognised accommodation of a school may, from time to time, be revised by the Board, and there shall in no case be less than 80 cubic

feet of internal space and 8 square feet of internal area for each unit of the number of children in average attendance for which the school is recognised."

Article 19 enacts: "If the inspector finds at any visit to a school that the premises and offices are not kept in a clean and healthy condition, or that any room is habitually used for a larger number of scholars than that for which it is passed by the Board, he will at once report accordingly."

Practical experience, unfortunately, shows that the Code is really inoperative, as far as sanitation is concerned, mainly for the sufficient reason that few of H. M. Inspectors have had the training necessary to enable them to detect even gross departures from a clean and healthy condition.

We must, however, turn to the immediate object of this paper. Two main problems have to be solved: (1) Who should make the necessary inspections? (2) To what matters should the inspector especially devote his attention?

With regard to the first problem, it is essential that the officer appointed should be a medical man with expert knowledge of sanitation and a general knowledge of the routine of school life.

The duties of the inspector. These are obviously two-fold. In the first place, he should point out to the head teachers how to make the best use of the material at their disposal, and in the next place report at stated intervals to his authority.

The following appear to be the essential details and some of the chief points of difficulty:—

(*a*) PLAYGROUNDS.—Size; surface; if properly drained; if properly swept and supervised.

(*b*) SCHOOL-ROOMS.—*Dimensions* (floor-space and height): accommodation recognised by the Board of Education. Number of children present; maximum present during the year. Is the overcrowding (if any) due to lack of accommodation or to faulty grouping of the children?

It would be convenient if the dimensions were clearly printed on the door of each class-room, so that the space per child present could be easily ascertained.

FLOORS AND WALLS.—Character; cleanliness; efficiency of the caretaker. Is the room ceiled?

VENTILATION.—Method; how used; how far successful; how can it be improved.

LIGHTING.—Method; how used; how far successful; how can it be improved.

Both the direction and quantity of light are frequently unsatisfactory, especially in non-provided schools, which have often been built for other purposes. The lighting should be sufficient to enable an inspector with normal vision to read the smallest test type between 9 a.m. and 3 p.m. in any part of the room where children work on any average day. The position of the blackboard is often not well chosen, nor is the size of the letters occasionally used by younger teachers.

(*c*) FURNITURE.—General character; adaptability to children of different sizes. Have slates been abolished? Are there any galleries in the infant room?

Cupboards can often be inspected with advantage. Some managers carefully store up the copy books of past generations, and their accompanying dust, as though they were precious relics, which would one day have a market value. This kind of dry rubbish should be periodically despatched to the nearest paper mill or destructor.

(*d*) LAVATORIES.—Number and kind of basins; water supply; nature of fittings; if properly cleansed; supplied with clean towels.

(*e*) CLOAK-ROOM.—Sufficiency of space and of pegs; if properly ventilated.

(*f*) SANITARY OFFICES.—Structure; sufficiency; how flushed; if properly cleansed, lighted, and ventilated.

In most cases one has to be content with the type of closet already in existence, unless actual nuisance has arisen. Where renewals are necessary there is no doubt that in the civilized parts of this country a sufficient number of some simple form of wash-down closet, with separate water-waste preventer cisterns, should be provided. Children should, if necessary, be taught to use these conveniences properly. Urinals should always have a sufficient water supply. Properly constructed closets may well be placed in more accessible positions than the old-fashioned middens and troughs, which were naturally placed at a distance from the schoolroom because of their frequently giving rise to effluvium nuisance.

(*g*) DRAINAGE SYSTEM.—Plan; how tested; if inspection chambers are provided; do any of the soil drains pass near or under the school buildings.

In a modern school the drainage system should be as simple as possible. Whether the drains are new or old, ample means of access should be provided, so that periodical inspection may be easy and effectual. Any defects must be dealt with on general principles, though it would take too long to discuss what defects would justify condemnation.

SANITARY INSPECTION OF SCHOOLS.

By Miss CONSTANCE COCHRANE.

(MEMBER.)

SUCH experience as has fallen to my share respecting the sanitary inspection of elementary schools in rural districts, has, I believe, been very fairly representative of other schools of the same kind elsewhere.

I am sorry to say that the sanitary condition of rural districts has in the majority of instances been much neglected in the past, and the schools have more or less shared the same fate as their surroundings. One very urgent matter is the absence at many schools of wholesome drinking water for the children.

His Majesty's Inspectors have not in the past been required to inquire into drinking water supply excepting for new schools, and it is not an uncommon thing for the school water to be either badly polluted, or scarce, or altogether absent. It is quite useless, as a rule, to look to the Rural District Councils, as at present constituted, or to a majority of the school managers, to rectify such evils. They will have to be dealt with by the County Councils, which I am glad to say are in some counties giving considerable attention to the matter (including the county of Cambridge, with which I am connected). The ultimate results of their action should be eminently satisfactory, and should lead in time to a general leavening up of the sanitary condition of villages, and possibly the provision of water supplies over much larger areas, administered by the County Councils and financed by county rates. It is unfortunate that so much prejudice still exists as to the use of properly filtered rain-water for drinking purposes in localities where good water does not exist, and the cost of utilising a public supply would be too heavy for the rates in a poor scattered district.

It is gratifying to find that almost everywhere at the present moment there is a movement in the direction of improving the sanitary condition of schools, and such a movement is naturally accompanied by the demand for more qualified inspection.

But in asking for highly qualified inspectors for even the smallest

village school, it is to be hoped that the mistake will not be made of multiplying the number of inspectors. One thoroughly competent man or woman is of more value than twenty who are incompetent; and the interests of the children, the ratepayers, and the community at large must be counted of greater importance than the finding of jobs for persons in search of them, and fortunate enough, from their own point of view, to have friends in an influential position.

I believe I am right in saying that in the past His Majesty's Inspectors of schools in rural districts have not been required to hold any public health diplomas, or indeed to be qualified in any way which would enable them as experts to judge of the sanitary condition of schools and their equipment, or of the likelihood of the drinking water being wholesome or the reverse.

Should not inspectors be required in future to possess these qualifications, besides having a sound all-round education, such as would fit them for the ordinary duties of inspection?

In consequence of their ignorance of child life, and owing to want of special training, some of His Majesty's Inspectors become mere faddists on particular points of education and sanitation, which they try to enforce in the schools.

Personally I should like to see more trained women appointed as inspectors of elementary schools in rural districts, where nearly all the children are under 12 or 13 years of age. Women would, by their innate sympathy with the young, be able to observe and understand much that natural to their sex in dealing with children. Some amusing stories are told about the ignorance of young male scholars fresh from college, as to the capabilities of the infant classes. Such young men are not usually considered authorities in their own homes on the mental and other capacities of the babies! and although some of them learn in time, it is at the expense of the teachers, and of the well-being of the children.

As one result the needlework is often allowed to suffer. Of a small school in the Midlands a lady manager lately stated that the inspector was incapable of examining the needlework, and knew nothing about it. On one occasion he remarked that it was a pity the girls were obliged to waste their time at it. If men are to continue to inspect needlework, it is really very important that they should previously receive instruction which would qualify them to understand sewing, cutting out, knitting, etc. They should also be made to realize, more than they do at present, how extremely injurious it is for young children to make small stitches, and to do fine needlework.

As to frequency of inspection, it would appear that the three or four inspections now made in the course of the year by His Majesty's Inspectors are sufficient, especially in view of the satisfactory fact that they are nearly always surprise visits. But, in addition to such inspection, it is no doubt very desirable that the County Councils should occasionally assure themselves as to how their own regulations as to sanitation, etc., as well as the general recommendations made by His Majesty's Inspectors are carried out; and for such a purpose it seems that at least one surprise visit a year at uncertain intervals, should be made by highly qualified and thoroughly expert inspectors on the part of the County Councils to every village and other school under their supervision.

Of the many great and urgent questions of the day, those which affect the health and prosperity of the children should appeal with special force to the chivalry of the man and the heart of the woman. Whether it is the health of the home, or the health of the school, that is neglected, the little child at all events is helpless and guiltless, and by its very helplessness and innocent confidence should be secure of obtaining from every responsible man and woman (and who is not responsible?) a fair start in the great race of life, in which the children of the poor especially are so terribly handicapped when their reserves of health and capacity have been wasted by their guardians in the days of their infancy and childhood.

[*This Discussion applies to the subject before the Conference for Thursday Afternoon: "Schools—Sanitary Inspection."*]

DR. W. COLLINGRIDGE (City of London), speaking on the inspection of schools for sanitary purposes, said that he thought that this would be best done by the department of sanitary authorities, the medical officer of health, carried out in detail by inspectors under his supervision; he thought the only proper way for dealing with non-provided schools in London and the country, also for the public elementary schools, was for the various councils to hand over the question of the inspection of drains and general sanitary conditions entirely to the sanitary authorities, because, whatever opinion might be given by other authorities, they and they alone were responsible.

MISS MAITLAND (Oxford), referring to the mention of the many authorities who take part in the education of the country, called special attention to the

managers and the need there was that, by means of their trained knowledge, they should take a thorough interest in the physical and mental health of the children, and deal competently with it in leading their colleagues aright, the experience of their own housewifely and maternal life rendering them such efficient helpers to young and unmarried teachers.

DR. P. BOOBBYER (Nottingham) agreed that the function of advising local authorities almost necessarily devolved upon the medical officer of health and the health committee with regard to the means by which the inspection should be carried out by special inspectors trained in the matters of school hygiene.

DR. A. M. FRASER (Portsmouth) spoke in support of the view that the medical officer of health is the proper official to supervise school inspection. The reasons which led him to that conclusion were that the principal part of the population in which the medical officer of health expects to see benefits arise from his action are the children. The principal assistants of the medical officer must be the teachers. They must be trained in elementary hygiene, and both personally and generally they must carry out the details of sanitary inspection, referring to the medical officer any matters of difficulty. Another class of official who might be employed more or less in the personal examination of the children were the attendance officers.

MISS FROOD (King Alfred School Society) desired to emphasise the point made by several speakers that it was most important for all teachers on the staff to be competent to judge of the physical condition of the children. It was the teacher who came into real contact with the children; the teacher had to judge of the physical well-being of the child and of the conditions surrounding it.

PROFESSOR J. EDGAR (St. Andrew's University) thought that managers' visits should be like angels' visits, few and far between. Appoint good teachers to start with, and then trust them absolutely. From one or two of the speeches it almost seemed that they were to have sanitary inspectors apart from hygienic inspectors, in addition medical inspectors, and beyond them apparently those who would have to teach hygiene and to conduct the clinical work in the schools. Was it likely that under such circumstances they could be really successful educators and administrators of education. It was a very important matter to have the teacher sufficiently educated to note the facts for the medical adviser and be able to carry out his instructions. He hoped they would in time have men who would combine with regular medical inspection a certain amount of instruction in hygiene in the widest sense, and also instruction in the application of physiology.

Dr. Kerr (London County Council Education Committee) thought it would be an exceedingly good thing, and one that was to be urgently desired, to place all schools and institutions in the care of the sanitary authority, provided that the sanitary authority always acted with discretion and with knowledge. Unfortunately, as they had been told, there were fads in education as there are fads in other things. What held to-day was gone to-morrow. If one were to hand over the schools to the management of the sanitary authority, they must be prepared to put up with endless cost, much waste of money, and a good deal of friction. The reason why the schools are not in a good sanitary state, was that the Education Department had retained the management of these schools in its own hands, and from the day it started as an Education Department to the day it became a Board of Education, had absolutely conducted the schools without any regard whatever to sanitary oversight. The educational view of school work, and the way schools should be conducted, were totally different from the sanitary officer's view of life. The local authority was apt to view private buildings, and even schools and kindred institutions, from what they might call the plumber's point of view. Sanitary engineering often took up attention very much more than the school point of view. These little details should be subordinated to the whole condition of what at present is regarded as the normal condition and normal children. The examination of these children, as Professor Edgar suggested, was a study of all school conditions—the whole conditions under which educational operations were carried on: conditions of fatigue, school furniture, above all play and exercise. All these things constituted a study, a direct aim in life, and were not a small part of some other question of public administration. He believed that if they were to make any progress in educational hygiene it would have to be through a popular demand, and they must have men to do the work who would make that purpose their end and aim in life. Dr. Sykes's suggestion that the Board of Education ought to have medical department voiced the most crying need of all concerned in school hygiene in this country.

Dr. Crowley (Bradford) supported Dr. Sykes's view with regard to a medical adviser being appointed by the Board of Education.

Dr. Wellesley Harris (Lewisham) said he had come across a great number of private schools where, as the medical officers of health, they felt they had no right and authority, although there was great need for reform. He thought it was high time these schools were brought under the control of the sanitary authority by proper regulations.

Mr. C. A. Buckmaster (London) explained the position of the Board of Education with regard to the inspection of schools, and pointed out the difficulty of applying the same rules to schools in different places and situations.

DR. RITCHIE (Education Committee of Manchester) said no doubt there e a great many districts which could not afford to appoint a special medical er for the schools. In those cases the medical officer of health would be person who would combine in himself the greatest number of qualifications t him for the post. But in larger districts or towns where could they get a ical officer who would give his whole time to the duties of school inspection. who could unify his work by taking up not only the sanitary inspection of ols, but sanitary supervision and everything else, including details as to the ts in teaching affecting the development of the children, and so on, there. oubtedly, the medical officer of health would be out of place. The medical er of health in large towns was not a gentleman with any particular know- e as to children, their needs and requirements; not only so, but the medical er of health did not look on educational questions from a mythical educational t of view.

Some further discussion followed on the wording of the resolution relating the Inspection of Schools, in which DR. G. REID (Stafford), DR. GROVES e of Wight), DR. CHALMERS (Glasgow), DR. SYKES (St. Pancras), MR. ERMAN GRIFFITHS (Southport), and DR. RITCHIE (Manchester) took part, the resolution was amended and passed as given on page 188.

CONFERENCE ON SCHOOL HYGIENE.

Friday Morning, February 10th, 1905.

SUBJECT: **"TRAINING IN HYGIENE."—"Training of Teachers."**

ADDRESS

By Sir WILLIAM J. COLLINS, Kt., D.L., J.P., M.D., F.R.C.S.

Chairman of the London County Council Education Committee.

(FELLOW.)

AS an old associate or member or fellow of The Royal Sanitary Institute, and also as Chairman of the Education Committee of the London County Council, it has been a great pleasure to me to come here to take part in this Congress on School Hygiene, which the Council of the Institute has so thoughtfully arranged. I am here naturally as a learner, although I am not prepared to admit that all the kindly criticism to which the schools of the late School Board for London, and now of the London County Council, are sometimes subjected at educational conferences of this character are entirely justified by the facts of the case.

At the present time I think we can recognise pretty clearly certain streams of tendency which it may be possible for a conference like this to direct if they are going wrong, and to accentuate if they are going right. I notice first a stream of tendency which has been the subject of discussion and remarks both at this Conference and at others of a similar character in the shape of wholesale condemnation of examinations, or at any rate, of the multiplicity of examinations. We are met within the walls of the present habitat of the University of London, and if we had been meeting some years ago in the older University of London in its unreconstituted form, it might have seemed sacrilegious to speak disrespectfully of the examination system. At present perhaps we stand too close to the changes which have taken place to view them in their proper perspective, or to recognise at their proper value the other means for assessing knowledge, and for giving degrees and distinctions now employed in lieu of the accredited and perhaps antiquated mode of examination. There is always at conferences of this kind a

wholesale condemnation of cramming, though such a condemnation is generally unaccompanied by any definition of the meaning of that much-abused term, or any precise connotation of what Jeremy Bentham would have called a question-begging epithet.

Another strong tendency in elementary, though perhaps more in secondary, education, and one to which Sir Arthur Rücker referred in his opening address, is the reaction toward the humanities, as against science teaching, and to include in the teaching of our children some knowledge of the world around them; that, perhaps, has at the present day led to some neglect of the old maxim, "Know thyself." At any rate it may be desirable that a conference of this character should assess rightly the value to be placed upon the humanities on the one hand and scientific instruction upon the other.

Then I note a tendency towards a recognition of the need for a more scientific study of our scholars. As a medical man I naturally welcome such a tendency. I observe also that Sir Arthur Rücker in his opening address quoted some of our French critics on our methods of sanitation with regard to infectious disease. I do not know how that may be, but I am afraid that if some of the continental methods of using our scholars as clinical material for anthropometrical survey were attempted it might possibly at the present time lead to developments in our schools which we might not desire.

Lastly, I notice there is emphatically a tendency towards further and closer association of the teacher and the doctor—of medicine and education. I emphatically agree that a closer association of medicine and teaching is eminently desirable, and now that education has become a matter of municipal duty, I believe that sanitation and education will work together in closer harmony in the future than has ever been the case before. It has been said that the Victorian era, which is even now receding into history, and is sometimes spoken of disparagingly, was essentially the era of three great reforms: the era of municipalisation; the era of the earlier development of national education; and the era of the development, pre-eminently, of sanitation. I rejoice to think that under existing legislation it is possible to combine, in the interests alike of the teachers and the taught, the benefits of municipalisation with those of education and also of sanitation, in which the whole body politic is so deeply concerned. I am therefore specially glad to be here this morning to take part in this Conference.

TRAINING OF TEACHERS.

By THE MOST HONOURABLE
THE MARCHIONESS OF LONDONDERRY.

I AM very glad that this Conference on School Hygiene has named as one of the special subjects for discussion the important subject of the Training of Teachers. One of the most lamentable defects of the ordinary public discussion as to physical deterioration, and as to how our children should be handled in the public elementary schools, has always been this; that people overlook the fact that it is no use laying down that the children should be taught such and such subjects, or in such and such a way, unless the teachers who actually are in the schools are capable of thus teaching them and are really equipped for this purpose. It is further forgotten how long a period is necessary to provide existing teachers with information or with notions of method which they happen not to possess, or to provide the schools with new teachers who do possess the requisite qualifications.

It is so easy (and the medical profession particularly offends in this respect) to declare that so-and-so ought immediately to be provided in all elementary schools, or that such a subject should be prohibited and such and such a subject should be inserted in its place in the curriculum.

What I think we, as a Conference, must specially consider is :—What are the most practical and most speedy means for equipping the existing teachers with such an attitude of mind towards the subjects in which we are now interested, and with such facilities for handling the children well in these subjects, as to bring about the condition of things which we all agree to be desirable.

I imagine that roughly there are two schools of thought in this regard: one which insists that all schools should have specialist instructors for what I may call the domestic economy subjects and for hygiene, so as to insure that the subjects shall be scientifically taught in a way that the *ordinary* teacher is almost certainly unable to do; and the other which considers it so vitally important that these domestic subjects should be looked upon as, and should be felt by children and teachers to be, essential elements in the ordinary curriculum, that they prefer that the ordinary teacher should teach these subjects, even at a lower level of knowledge, rather than that the employment of a specialist teacher should seem to divorce these subjects from the ordinary life and teaching of the school.

I feel myself that there is a great deal to be said for the second of these points of view, and that we want, in fact, that all our women teachers (at all events, in the elementary schools) should have in mind all the time the practical side, the needs of the home lives of the children, and the urgent importance of developing not only the book-learning side but the practical side, so as to make the school life in some measure have those effects upon the children which the home should have or should have had, did not the State deprive the children of these natural home chances by requiring their attendance all day long at the school.

The Durham Local Education Authority is anxiously striving to get the local managers and teachers of the elementary schools to become closely interested in this side of the school life, and they keenly hope that some practical suggestions on these important subjects may be forthcoming from this important conference.

It is an extraordinary thing that the training colleges for teachers in this country, which have been supported at vast expenditure of public funds for fifty years, should have for the most part failed to give any courses in practical subjects of domestic economy (except needlework, which has probably been very largely *over*done) and that it has been left to sporadic efforts here and there, by voluntary agencies for the most part, to provide somewhat limited facilities for training future teachers in domestic subjects. This in itself has tended to divorce the practical subjects from the book-learning subjects, and has in that regard undoubtedly been unfortunate. There has also, I do not doubt, been a great tendency in such training schools as exist for domestic subjects, to allow or even incite their students to soar to the higher flights in cookery, domestic economy, etc., and to go into wide questions of what is called theory; instead of making sure that skill is acquired in *the actual practice of the simple processes*, and that aptitude is attained in instructing the children to acquire the same skill *in actual practice.*

It is no doubt tempting to look upon these subjects as affording, so to say, practical object lessons in science, and there is a certain amount of truth in this view. But we must also remember that it is essential that the children should, on completing the course, be able actually to *do* effectively the various duties in the home, such as cooking, and not merely that they should be able to use learned phrases as to albumenoids, bone-forming elements, foods, and so forth.

Simple instruction in the elements of the theory may be desirable to produce the right attitude of mind in the child, but *actual practice*, resulting in distinct ability to do and make, is equally essential.

TRAINING IN HYGIENE FOR TEACHERS.

By Prof. C. S. SHERRINGTON, M.A., M.D., D.Sc., Hon. LL.D., F.R.S.

University of Liverpool.

THE course of training in hygiene desirable for teachers becomes, perhaps, best evident by considering the reasons that demand from the teacher a knowledge of that subject.

The great educational reform of 1870 was incomplete in that it made no provision for education of the body; that was regarded either as a luxury of the upper classes or a thing that came by nature. To-day it is felt that those to whom schools are entrusted should have due understanding of the care and development of the young human frame. The gravity of the health problem involved in school life is often urged. Take as an instance child growth. It is a sacred trust of the parent to safeguard the growth of his child, to help and not to hinder it. And this responsibility is one that the parent, and at the bidding of the State, partly deputes to the school-master and school-mistress. Let us remember how for certain years of our life each one of us took daily from the world more material than met our actual day's activity. This surplus we each retained, and it was marvellously built up into our living selves, so that the year's end found us taller, with larger and more powerful muscles, and with larger and more perfect brain than at the year's outset. If through a normal course of years we do this duly we find ourselves gradually equipped with the full powers of adult men and women, able to play our part and bear our burdens as normal citizens.

Those years of growth are years of opportunity that never return, and on what is made of them depends in aggregate the nation itself.

There has been questioning of late, urgent and passionate, in the press and on the platform, whether among our population child growth is not being crushed lower than formerly, by the adversities of life. If so, our population is deteriorating. Growth is a great natural process, but the modern city can upset it. The biologist notes how while round some organisms the play of the environment alters little throughout ages,

round others the tide of change runs like a mill-race. One of those for whom it is running fast is man, and the change round him, the stress upon him, is, ironically enough, mainly of his own making, civilization. It may well be that in this stress, in the vast city with its crowded lives, its indoor bread-winning, its hours of toil prolonged far into night by gas-light; the child, whose ancestors till less than fifty generations back were for ages upon ages hunters and herdsmen, now in this crisis requires skilled protection for its growth of body. Mischief, though not amounting to actual disease, can warp and maim the child in body and mind; influences seen by the school-teacher rather than by the doctor, hours of breathing vitiated air, semi-starvation from insufficient or improper food, or want of warm clothing that economises food, chronic fatigue, the sign of child wages earned late after or early before school, and sequences of nights of curtailed rest. While these mischiefs exist to the extent they do, we must feel that we have with us strong tendencies that, at least, make for that deterioration in our people which is feared to-day.

Against it a first line of defence lies in a healthy life in school. It is in youth that such irreparable harm is done. To fortify this first line of defence the school must have knowledge of the laws of health. And for this the teacher must *know what the body is.*

Science, patiently toiling, has proved that the material elements composing animate things, ourselves for instance, are amongst the commonest that compose inanimate things as well. The laws of quantitative mutability and conservation of energy hold good in our frame as in the plant, the tide, the waterfall, the furnace. Hence it is practicable to study the body much as the engineer studies a machine. The engineer studies a machine that he may work it to the best advantage, may if it break repair it, or make a new one. The physiologist, in reverent study of the living machine, knows well, no one so well, that he cannot make another, let alone improve upon construction. But he can learn how best to safeguard it from damage as it works. From birth to death it works unceasingly. Even in sleep it is a scene of ceaseless interchange of power. In childhood it runs fastest, and against a stress particularly severe. Each pound of a child's body needs more food than does that of an adult. It demands not only a surplus for its growth, but more for actual running; it gives out more heat and it consumes more air, even despite its longer normal hours of sleep. This phase of life, when the machine is running hardest, is also that when it is *plastic;* those trusted with its supervision *then* can not only safeguard it as it works, but impress on it good habits of work, training its powers to their best advantage.

To know the body requires more than mere study of corporeal forms,

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To know the body requires more than mere study of corporeal forms,

the mere form of the frame is chiefly significant where it is machinery for application of mechanical powers. But most of the corporeal machinery has its purpose, not in mere mechanical processes, but in chemical, thermal, electrical, to which (marvellous appendage) mentality is adjunct. It is clear that chemistry must feature primally in any course of instruction in the *laws of health.* The body is a fuel-fed machine. The energy we dispense each day in our various activities, talking, walking, climbing omnibuses, or taking cabs, all comes as chemical energy, in the suitable material termed food. The process of its extraction from that food is chemical. Our body is in short a chemical machine, and, wedged into the world on which it lives, its material commerce with that world is chiefly chemical. Even in quietude, asleep, it still consumes air round it, warming and charging that with water and carbonic acid.

Though only in boarding-schools are children fed, I would venture to urge, with the British Association Committee on Health in School, that every school teacher should know something of the chemistry of food as one of the general conditions influencing health and development, just as does air itself.

Essential to the understanding of the laws of health is also some knowledge of physical science. Ventilation and drainage cannot be really understood without such knowledge. Neither can the care of the great sense organs, the eye and ear. The eyeball works under the same optical laws as hold in the lens and prism, and I suppose pure physical defects of eye form more than half of all school troubles in eyesight. Our present school life is under grave suspicion of engendering much harm to sight. There is a constant tendency in the strain of civilized life to work at the very limit of the power of the senses, and this is true especially of the demand on eye-sight.. Economy of paper, getting as much as possible into each printed page, economy of gas, electricity, or window space in lighting, saves at the cost of extravagant strain to sight. Much of the fatigue of the class-room is eye-fatigue. The senses are the avenues to the mind, and the sense organs of his child-pupil must be objects of solicitude to the teacher as his violin is to the musician, or his tool to the engraver. Without the children's eyes and ears the teacher can do little. Now school hygiene is practical hygiene, and practical hygiene requires practical observations, and for practical observations simple but accurate instruments have to be used. Among them I would include a pair of spectacles, a wet-bulb thermometer, and weighing machine; these, and others, though simple, demand some modicum of physical knowledge from those who would employ them intelligently.

There is one study more, without which no competent insight into the

corporeal life of the child can be hoped for, be the observer ever so earnest. The child is a part of a great chain of being that ends in man. Here, if anywhere, it is impossible to comprehend the part without some general conception of the whole. The child, that end-link, the supreme object of our study, forged latest, is in a sense the outcome of its forerunners. The long train of pre-existent beings has been a condition of the construction and creation of the child. We can no more hope to realise the place and circumstances of this new comer when taken apart from the rest, than to appreciate a sentence torn from its context in a closely reasoned argument. Here, what Huxley termed Elementary Biology, or what the Germans call Allgemeine Physiologie, can serve us; a broad review of types of living things and of their life-conditions, sampled in sequence from the simpler upward.

And this review of Nature's systems, plant and animal together, touches and explains the phenomenon of sex, a phenomenon which meets the teacher's work at many points: this it introduces and explains in a most healthy and impersonal manner. Biology, indeed, touches the roots of life; the old Greek simile likened our body to the body politic, the State, a corporate whole composed of individual members. The biological truth revealed by science concerning the body far transcends the Greek imagining. Our body is literally a commonwealth of individual lives outnumbering in each one of us the whole earth's human population. And each of these component units is a self-centred individually-living microcosm, individually born, breathing for itself, feeding itself, destined for individual death, and contributing, like a good citizen, its share to the corporate functions of the whole. In that each one of us is a commonwealth of individually-living units, of which some are dying every hour and others are hourly born to take the place of the dead, we are like every animal and every plant we see. And each of these commonwealths began its individual existence as a single unit, whence arose the myriads that compose its adult being.

Biological analysis begins with the archetype, a primordial unit which has remained isolate, a microscopic organism, a lowly life but perfect, and the prototype of the component units of the human body. Some of these lowly microscopic forms are of momentous consequence to man's existence. Though many assist his life, some are among its deadliest enemies. Thus, the seed of tuberculosis, which, in the form of consumption, scrofula, lupus, meningitis, &c., works havoc with child-health, is among these germs. Many sanitary measures of importance can only be duly appreciated and practised in the light of biology, this study which pieces together the various types of life into one whole, the most complex and the most

primitive together. There is the homely case of milk-supply. Milk as it leaves the cow is free from germs, yet, as distributed in tons daily to feed children in London, its every teaspoonful contains some 15,000,000 living germs. To know biology is to know the enormity of this. For the teachers, whose children it menaces, to know its enormity is to arm them to fight the danger, and to aid reform.

Equipped with some apt knowledge of *Chemistry*, *Physics*, and *Biology*, the student is ready to understand the working of the human body. He can learn what science has to tell about its nutrition, and that great phase of it, the healthy heritage of childhood, growth. He can enter on study of the work of muscles and of nerves. He grasps the meaning of the temperature of the child, and how the child is a furnace that burns more ardently but less steadily than does the adult, influenced more by external heat and cold than is the adult, just as he is more sensitive to vitiated air. He learns a philosophy of clothes that Carlyle never dealt with, a natural philosophy of wet boots, of real importance to the child and therefore to the teacher. From the physiology of the muscles and the nervous system he learns the rationale of exercises of physical training, yearly becoming more prominent in school work. Authorities rightly require examination in the theory as well as the practice of these exercises; as Demeny shows, nothing is easier than for these exercises to miss their aim if applied unintelligently, that is, without knowledge of the physiology they involve. Moreover, rule of thumb is applicable only to the supposititious *average* child, that statistic being one so rarely seems to meet. But armed with knowledge of the scientific basis of the work the teacher's common sense can meet the *individual* case. That simplifies the gauging of endurance, the slight modifications of method required here and there, the recognition of fatigue and the detection of weakness. Mastery of the subject can proceed only from knowledge of principles underlying the work. Educational authorities of primary schools ask some training in physiology from their teachers. Much more responsibility than in day schools is taken by those who conduct boarding schools, our great secondary so-called public schools, for instance. In them the head-master and the house-masters accept the supervision of large continuous fractions of the child's life. They take the responsibility of the child's rest as well as its activity, in class-room and in playground. From them is due full knowledge not only of the psychology of children but of physiological child-nature. The results of the modern analysis of fatigue, the self-poisoning of the body under its own activity, its nature and its phases in muscle, in nerve, in sense-organ, in class-room, and in playground, these to the house-master are items of routine importance; and so on the other hand the nature and

meaning of that great physiological process, sleep, and all its significance for the growing child. There are no hours in the playground that give literally such re-creation as do those of sleep. Most of a child's growth is done in bed. Yet, as I hear, some of our great public schools allow a child of thirteen no longer sleep than many a man of forty wisely allows himself. A difficulty for the masters in our great public schools is that they have for the most part gone down from the old universities without any knowledge of biological science, and without even any of chemistry or physics. Hygiene is, therefore, although they may be anxious to understand it, beyond their immediate grasp. The Board of Education now urges that the teacher should not only go through some syllabus of natural study, but should, by first-hand acquaintance with Natural Science, fit himself for work in some field of nature open to him. Such a field, and one particularly open to the teacher, lies in the physiology and natural history of the child. From it proceeds school hygiene, the science and practice of the laws of health as related to the scholar and the school. It would be well if this *physiology* and this *hygiene* could be taught together. Their interests mutually reinforce. Physiology gives the basis and hygiene the application.

Hygiene has two aspects in school life. One is personal to the scholar: the phases of development of the child, its seasonal and periodic growth, the influence on its health of cleanliness, clothing, habits of posture, free respiration, due adjustment of work and exercise and rest, the care of eye and ear, the training of the muscles, the avoidance of over-strain of muscle and of nervous system. The Board of Education, in its recent regulations for the training of teachers, lays stress on the detection by the teacher of defects in sight, in hearing, and in muscular and nervous power in children. In London children's sight is widely examined by teachers, who report deficiency to appointed experts. In this way the field of operation of the expert is beneficently extended. It is an object lesson in intelligent co-operation between the educational hygienist and the expert medical hygienist. We do not want the teacher to do the work of a medical man, that is impossible. But the school teacher should be able to co-operate intelligently with the medical man. That is impossible unless he knows the outlines of physiological principles and the laws of health, and knows them not merely from books, but *practically*. Take mouth breathing. Mouth breathing children are usually deaf, and this cripples them for instruction which is chiefly oral. Many stupid children might be changed to normal by the correction of mouth breathing. To inspect and search 10,000 children medically for mouth breathers is costly. For the teachers themselves to sift out the mouth breathers

prior to a medical visit would possess economical as well as other advantages.

The other aspect of hygiene for the teacher regards general conditions in the school: ventilation and lighting, natural and artificial, of class-rooms; school furniture and its effect on posture; drinking water, filters and drinking vessels; drainage, sanitation, and, not least, the print of lesson books, etc. Boarding schools, accepting as they do, responsibility for the child's twenty-four hours' round, involve themselves especially heavily in hygiene. With them rise questions of food, its quality and preparation, its variety, the meal-time in relation to the school day, the length of the school day, questions of the dormitory, and of the hours of rest required for different ages.

Hygiene is in fact an applied study, taking source from several sciences, and in that resembles medicine itself. Its concern is *cultivation of health.* That cultivation is in no period more fruitful than during the years of school life. For the teacher the importance of knowledge with this scope seems to me equalled only by the importance to the nation of his knowing it. It so materially assists him to give more help to the young lives under his charge. Further, possessing it, the teacher can, where it is fit, impart to the scholars *rules* regarding health and *reasons* for them. I have passed over this teaching hygiene to children, not from want of feeling its importance, but from respect for your time. If some such instruction were given, for instance, to the older boys in our large public schools, useful knowledge might replace ignorant superstition, such as prevails among them regarding dietary training for running.

My remarks have been general, I fear too much so. I would, in conclusion, pass to one specific detail, an instance of a curriculum now at work, which tends towards the aims for which we are considering the means. The University of Liverpool requires its students training for teachers to attend a three months' course in school hygiene, after a three months' course in the physiology of the sense organs and nervous system, before proceeding to the B.A. degree in education. It has also a post-graduate course in education for a Diploma of Education. In the curriculum for this there is provided three months' attendance on general physiology, followed by three months in psychological physiology, and three months in school hygiene. Much longer established than these courses have been the excellent examinations in hygiene for teachers, which are owing to the energy and foresight of The Royal Sanitary Institute.

TRAINING IN HYGIENE AT SCHOOL.

By Professor HENRY R. KENWOOD, M.B., D.P.H.

University College, London.

(FELLOW.)

THE ignorance among the poor of household management and of the principles of hygiene is responsible in no small measure for their high preventable mortality, their inferior physique, their intemperance, and their poverty. When material and moral hygiene are generally and properly taught, the future generation will realise in greater numbers the degradation of unhealthy, underfed, filthy and ragged children, of filthy homes and of alcoholism.

How possible it is to better the conditions of modern life, and thus to improve the health, happiness and physical powers of the people (and thereby their mental vigour and industrial efficiency) is common knowledge to those whose duties take them into the homes of the people and bring them in contact with the occupants. The rate of infantile mortality, swollen in this country by thousands of preventable deaths each year, is a death-toll levied by the lack of wholesome living, and it indicates the extent to which those conditions which are responsible for such a mortality must maim others who are capable of surviving them. This state of things is most expensive to the State; but the very prevalent lack of personal responsibility among the poor would land us in a serious quandary if all the measures of alleviation recommended by superficial thinkers were carried out. The proper cure of all these evils is a suitable hygienic education, moral and material, of the future parents. Teach and encourage them to help themselves, but let us beware of doing too much to relieve them of their obligations as parents and citizens.

THE KNOWLEDGE AND TRAINING OF THE TEACHER.

The usefulness of the teacher depends less on what he knows than upon his powers of imparting his knowledge to children, and upon the spirit in which he sets himself to fulfil his important mission. He must be interested in his subject, fully appreciate its importance, and enter

with enthusiasm upon his task; and he should aim to offer in himself an object-lesson of the complete realisation of the fullest aims of education. Such an one would find no difficulty in awakening and maintaining an intelligent interest among his pupils in such a subject as Hygiene.

If the teacher is properly taught and trained the pupils will be so too, and hence the prime importance of appointing teachers (medical men who are known from their experience and by their natural gifts to be competent individuals for the instruction of the students in the training colleges).

This training of the teacher must be *as practical as possible*, and the teaching cannot be too fully illustrated by apparatus, experiments, and visits to places where the practical application of hygienic principles may be seen.

The scope of the teacher's training must clearly depend upon the matter which is to be taught and the other co-related duties which are cast upon him. The teaching *should only deal with essentials*, and a scheme including all the matters of personal and domestic hygiene that are essential *to his pupils*, and which would (if generally practised) reduce the sum of preventable misery, suffering, and death very considerably, need not fill more than a dozen pages of foolscap.

But the teacher has to do something more than teach hygiene; he must have the knowledge which will fit him for the discharge of other important duties. These may be grouped under two heads:—

1. Not only should he be trained to detect the symptoms of defects in mental development and of vision, of commencing bodily deformities, and of signs of ill-health (including communicable diseases), but he should possess a knowledge of the methods of physical training and of their rationale. The knowledge of a few elementary principles of psychology is also essential, and he should be capable of taking a few simple anthropometrical measurements of the scholars, say every six months; for in addition to their value for other purposes these will serve to indicate those children who are being neglected by their parents.

2. The supervision of the hygienic environment of the pupils while at school.

If the teacher is to have an intelligent appreciation of the significance of hygienic principles he must be taught the elements of physiology. The two subjects naturally go hand in hand, *and must be taught together.* A general acquaintanceship with the physiological functions of the respiratory, circulatory, digestive, nervous and integumentary systems is essential to a proper understanding of the laws of health; but the teaching should be *strictly confined to the physiological principles upon which these laws are based.* There is no sufficient reason, in my opinion, to

teach 50 per cent. of the physiology and histology which is set out in even the very small works upon hygiene, at present in circulation. The laws of health are simple and few; they could be incorporated in a dozen commandments; and the physiology necessary to explain them, and to make their importance appreciated, can be adequately set out in a very short space, and in simple non-technical language. As an examiner of some experience, I am heartily sick of examining papers in which those who are supposed to have been taught hygiene, and to have benefitted by the teaching, are crammed full of scientific and technical terms which they rarely properly understand, and often do not spell correctly. So long as this sort of thing masquerades as knowledge, much of our present hygienic teaching stands condemned. Many text books show the same lack of appreciation of the real requirements of the subject; though labelled "elementary" and "practical," they are neither; and useful facts are smothered up in an abundance of other matter, a knowledge of which has no practical value whatever to the class of reader for which the book is designed.

THE TEACHING AND THE TRAINING OF THE SCHOLARS.

It must always be the aim of the teacher to train children in the habits of observation and reasoning, and thereby they will obtain, with the assistance of object-lessons in the school itself and of models and simple experiments, an intelligent appreciation of the main facts bearing upon health. He must strive to make them realize the importance of the subject, and to arouse in them a living interest in, and a desire to observe, the ideals of healthy moral and physical surroundings. The school regime must afford every opportunity for healthy bodily development, not only by training the scholars in suitable physical exercises and in encouraging them in a good selection of games, but also by continually presenting an object-lesson of the recognised importance of fresh air, cleanliness, etc. The teacher can do much by example, precept, and personal influence to create a sanitary conscience among the rising generation. Let him always foster a strong sense of discipline and duty, and thus prepare a fertile soil for the seeds of sanitary teaching to fall upon. To these ends he should enlist as far as possible the co-operation of parents in the home, and he should bring, if possible, his personal influence to bear upon them in certain cases. The training in the observation of sanitary precepts is a form of moral training, and if the home influences are antago-

room was well flushed with fresh air upon every available opportunity, that cleanliness obtained, that dust did not accumulate, and that all sanitary requirements were observed in the use of sanitary conveniences provided.

In my opinion every female child should be taught the elementary facts of cooking and infant-rearing, and there should be a kitchen and a work-room in connection with every girls' department. There should also be more supervision and control over scholars in the playground. They should not be allowed to run wild. More in the direction of character formation and moral training can be done by effective supervision and control in the playgrounds than in the class-room.

Provision ought always to be made for a half-yearly medical inspection of the scholars, and no improvement in the training of the teachers, or in the circumstances under which the scholar does his work, will suffice to remove the great necessity for this very important work.

Personally, I am not much in love with the somewhat indefinite term Hygiene, as denoting the range of education indicated above. The average individual does not realise the scope of the term, and I would prefer that the more taking title Domestic Economy and the Laws of Health were chosen.

The possession of citizens of good physical and moral stamina is the most valuable and abiding of all national assets, and for this the nation is almost entirely dependent upon what the educational influences of school life are made to be. Our object is therefore to educate all sections of the community to a conviction of the necessity of cleanliness of mind, body, and surroundings, and to combine this moral training with the knowledge of a few hygienic principles of healthy living and infant-rearing. There will then be no lack of worthy citizens who recognise their civic responsibilities and duties, and who are capable of observing them; and the reduction of disease, mental and physical incapacity, alcoholism and crime, will be the State's ample reward. This great blessing education can and ought to bestow. Why, then, do we lag behind in the dark when truth so clearly lights the way for our advance?

THE TRAINING OF TEACHERS.

By Professor J. EDGAR, M.A.,
University of St. Andrews.

ABSTRACT.

IN the matter of the teaching of hygiene, "the stage of consideration" (to use a phrase of the *Saturday Review*) must now be superseded by "the stage of action." Not only have 15,000 medical men, and the Commissioners on Physical Degeneration, recommended that such teaching should be made compulsory, but the English Board of Education and the Scotch Education Department have accepted that recommendation, and, to secure qualified teachers, now require that instruction in the subject be given in all training colleges, and by local committees for the training of teachers in connection with the universities.

The teaching of hygiene, and, what is not less important, teaching in the light of hygiene, needs special training. This special training it is the duty of Educational Authorities to provide. The problem of finding the best method of giving this training has now to be faced.

What is most needed to win for the subject its proper place in the training of teachers, and to assist in the organisation of the best method of teaching it? My answer is *an increase and extension of faith in the importance and value of school hygiene.* This faith is needed to inspire the minds of individual parents and of the community at large, to secure the interest and co-operation of the medical and teaching professions, and to stimulate the zeal of Educational Authorities.

It must be made clear that school hygiene, or hygienic physiology, is not an ornamental or supernumerary subject; that it is not a mere fad of The Royal Sanitary Institute or of a few individuals: that it lies at the basis of all education. Nay, more—that it runs through and is an important part of all the superstructure as well. No subject of instruction is more fraught with possibilities of good to the whole nation.

What is next needed is that *this faith should manifest itself in works.* The parent must show his faith by granting facilities in the case of his own children. The community must show its faith by encouraging its

educational boards to assist in the development and administration of good schemes for medical inspection, and by providing opportunities for clinical observation and instruction. The medical and teaching professions must show their faith by assisting the community to the utmost in smoothing away the preliminary difficulties which are sure to arise. At first new schemes may be endangered by professional jealousies, or obstacles raised by professional etiquette. Forbearance and co-operation on the part of the two professions will go far to secure success.

As a branch of the professional training of the teacher, hygiene must be understood in a sense at once wide and specialised. It must include a knowledge of those external and internal conditions of healthy growth, development, and life which ordinary hygiene and physiology have made known. *But it must not be content with general principles, it must pass to the concrete.* There must be on the one hand examination and criticism of school sites, class-rooms, furniture, heating and ventilating systems; and on the other clinical instruction in the school to illustrate simple methods of testing sight and hearing, and of taking weights and measurements, to guide observation of normal and abnormal signs in children, and to demonstrate the best ways of dealing in the class-room with typical cases.

THE PRESENT STATUS OF INSTRUCTION IN HYGIENE IN THE TRAINING COLLEGES.

By Miss S. YOUNG,
Home and Colonial Training College.

ABSTRACT.

IN the prefatory memorandum of the regulations for 1904, issued to the training colleges by the Board of Education, along with other counsels and directions for the preparation of the students in the principles and practice of teaching, it is affirmed that they should be instructed in the general conditions necessary for making a room healthy and keeping it so, be well acquainted with the rules of personal health, based as far as possible on physiological principles, while women students should know the nutritive value of food-stuffs. Five alternative programmes of topics related to the professional side of the work are appended, from which each college must select one. These courses vary as to the relative prominence given to psychology, logic, history of education, and other matters covered by the term Science and Art of Education, but all assign about equal place to an outline of subjects included under school hygiene.

The first point to be borne in mind is that the school hygiene is but a part of one subject in the training college curriculum variously termed, "principles and practice of teaching," "science and art of education," "technical training," &c. Again, this subject of which school hygiene is a section is but one of about a dozen different studies, acquaintance with which forms the professional equipment of each student. School hygiene is thus one of a crowd of competing branches of knowledge to be studied during the two years of training; whether it should have a paramount or equal or subordinate place among the crowd will perhaps be variously determined.

The teaching of hygiene, though not formulated as such, is practically in the hands of several members of the staff in each college. For instance, the teacher of gymnastics will give some theoretical instruction and practical rules relating to exercise, games, and other topics included under the heading "physical training," together with such knowledge of the

muscular, respiratory, and circulatory organs as she may deem necessary. The teacher of reading will lecture on the care of the voice and how to produce it economically. The science lecturer will include the chemistry of air and water in her syllabus, while the biology or nature study programme may cover a short course in elementary physiology. The mistress of method, *i.e.*, the member of the staff responsible for the professional training of the students, lectures on the health conditions of a school building and the symptoms of disease and other physical defects among children. Such a division of labour as this must inevitably result in overlapping and scrappiness of teaching. Much that should be included will be omitted, and the parts of the subject that *are* covered are not likely to be co-ordinated or made to rest upon coherent scientific knowledge. As a rule the teaching is not in the hands of experts, and by experts I mean people with the special training and the special diploma of some such body as The Royal Sanitary Institute. Since, as I have shown, instruction in this subject is always part of a larger whole, physical training, pedagogy, elocution, etc., only a few hours are allotted to it. Six to 15 hours out of a total of 90 or 100 given to the theory of education are the average share that falls to hygiene. To these must be added about as many more given in the science or physical training lecture-room.

The subject has been too much a matter to be got up from text-books, and has not been based sufficiently on first-hand evidence. The science teaching in the training colleges has of late years, however, included much more laboratory practice on the part of the student herself, and experiments and dissection are much more frequently than hitherto the source of the knowledge acquired in the chemistry and physiology parts of the subject.

The number and kind of the practising schools used by the training college determine the data available for knowledge of such matters as space, ventilation, light, warming, seats and desks, and other school conditions. Where the schools in the neighbourhood are antiquated in type, they must be used as warnings rather than as exemplars. Very little opportunity is afforded in schools that are not under the control of the college for the study of defective physical conditions as short sight, deafness, nerve-weakness, etc.—if, indeed, it is possible to have such opportunity outside of a hospital or without prolonged experience in one school. Certainly, if in the future every teacher will be expected to have a comprehensive knowledge of the science and practice of hygiene, then much more attention must be given in the training colleges to this subject than has hitherto been the case.

NOTES ON THE TRAINING OF TEACHERS OF HYGIENE.

By Mrs. EDDISON,
Yorkshire Ladies' Council of Education.

THE training of teachers of Hygiene appears to me to be so intimately connected with the training of teachers of Domestic Science and Domestic Art, that I should like to suggest the framing of some such scheme as the following, with a title yet to be conceived: a related scheme which should embrace much practical Elementary Physical Science including Chemistry, and Elementary Physiological Science including Hygiene.

I would suggest that the length of the course of training should be at least two years.

The first year should comprise a General course for all the students, who in the second year might specialize, as taste or qualification dictate, in either Domestic Science, which is "largely an application of other sciences to daily life," or in Hygiene, or in Domestic Art.

In the first year I would suggest a certain amount of Child study and of Nature study: Chemistry, Physiology, and Hygiene; not too technical, but sufficient for a good knowledge of the laws of health and its contributories, food, clothing, and shelter. Cookery, sewing, drawing, history of education, and physical training should be included.

Specialization in the second year for Domestic Science would include Cookery, Sewing, and Physical training, applied Chemistry and Bacteriology; add Laundry Work, Marketing, Serving, Household accounts, some Construction, Heating, Ventilation, and Plumbing, together with Drawing and Design, and Method and Practice in Teaching.

Specialization for Hygiene, not trenching much on the pathological side, might follow any approved course for which the first year would be a foundation.

Specialization for Domestic Art would develop along the lines of Method and Practice in Teaching, Physical training, Bacteriology, advanced Sewing, Dressmaking, Millinery, Art needlework, and Costume Design, etc.

A related course of this kind should draw its students from among girls of high school or even of college education.

TRAINING FOR TEACHERS.

By R. DAVIES ROBERTS, D.Sc.,
Registrar, Board for Extension of University Teaching, London University.

I ONLY desire to refer to the resolutions before the Conference, and specially to clause (*b*), which emphasises the importance of some general provision for the instruction of those teachers whose training is past, or who have never entered a training college. I take it that the Conference is quite agreed on the importance of making hygiene a subject of instruction in the training of teachers, and I gather from the reception of the remarks of previous speakers that it is quite clear that a sharp distinction is drawn between what the teacher must know, and what the teacher is going to impart to the children. The warmth with which Miss Ravenhill's remark, that the aim should be to diffuse a hygienic atmosphere in the school, shows that that sharp distinction is comprehended. It is quite clear that the more efficiently a teacher is trained, the more complete and wide and liberal the training has been, the more likely is the teacher to do what has been sketched, and the more likely is the end suggested to be attained. What is to be done for the teachers already engaged in the practice of their profession, and who have not had the opportunities which we hope teachers will have in the future in the training colleges? My object is to draw the attention of the Conference to the existence of educational machinery in the system of work which is carried on by the Board for the Extension of University Teaching, with which I have the honour to be connected—a system which makes immediate provision of the kind needed possible. Under that Board courses of lectures with associated classes may be arranged, extending over a period of two years. The system of teaching has been elaborated in such a way that it involves very much more than the mere lecture. There is a class with an opportunity for those who are attending the lectures to bring their difficulties to the teacher and discuss them. Further, there is the opportunity for serious students to do writing work on paper from week to week. At the end of the time examinations are held and certificates awarded. The courses are either terminal (ten lectures) and accompany-

ing classes, or sessional courses of twenty-five lectures and accompanying classes, and if a laboratory is available the course is made a practical one. This system is already being utilized in providing suitable courses for teachers in every subject of study. There is no reason why a similar course should not be at once arranged in the subject of hygiene, for either a session or a period of three years. The expense is so reasonable as to put the opportunity of study within the reach of all persons who may desire to see such a course arranged, and there might also be arranged practical demonstrations specially adapted to the wants of teachers. The system admits of the arrangement of a course of any centre in the London area where it may be desired, and there is every reason to believe that this machinery will be very much more used in the future for providing suitable courses to supplement the work of teachers who are engaged in the active practice of their profession who have missed opportunities while they were being trained of getting the necessary knowledge in some particular branch of study.

[*This Discussion applies to the subject before the Conference for Friday morning: "Training in Hygiene—Training of Teachers."*]

MISS E. HURLBATT (Bedford College for Women) thought the following facts had emerged from the discussion: first of all, that there are teachers already engaged in their professional work who, if they are to have their minds directed to a more enlightened knowledge and understanding of the problem of the teaching of the laws of health, must be taught by means of evening lectures or Saturday morning classes. But there was another class of teachers who would have to be considered, the student at present in training. Then there remained the most important class of teacher who, for practical purposes, needed to be considered, namely, those who were to become the experts. What would be the most practical outcome of a conference such as that would be to urge forward the formation of classes of instruction that would provide the essential training for the expert hygiene teacher.

DR. FRANCIS WARNER (London) said that to be a science, hygiene should deal with healthy conditions of the brain, producing healthy mental states as well as healthy conditions of the body. A great amount of mental confusion was certainly produced in the minds of young children by wrong methods of teaching, or by doing several distinct things at the same time. These and a number of other things could really only be taught to teachers by demonstration upon the children, and as a basis for dealing with their brains so as to produce healthy

minds much good would come; and where it had been practised much good had come from the direct observation of children, and the training of the teachers to record their observations and think over them. How common, for instance, it was to find pupils in the middle of school life to possess a very imperfect knowledge of what was meant by proportion, or even multiplication. Of course the rules of arithmetic were known, and accurate results could be got, but they never realized what proportion meant, and as a consequence had very indistinct notions. He thought a study of these questions would have great hygienic value in the schools.

Miss Sumi Miyakawa (Japan), having apologised for her broken English, thanked the Institute for having allowed her, a foreigner, to attend that most useful and interesting conference and to share the benefits of it. Although she could not understand all that was being discussed, she recognized one thing, the earnestness and kindness of those present in spending their precious time for the benefit of the community. In listening to all that had been said about the sanitary system, she had thought of her own country, and was sorry to say it was far behind. They had even no proper drainage system. She was so ashamed of it; they realized it already, but they had so many things to be improved first, there was no time and no money, especially while such expensive fireworks were going on in Manchuria. She therefore had no right to say anything about hygiene; but though Japan was a poor country they had some customs which might be found useful in the poorer quarters of England. There was the hot-bath system. She had recently visited a Liverpool truant school, and how they were giving hot baths to the children had been shown her. There was a large square place, and on asking where the boys washed before they went into it, was told "they wash themselves in that hot water," and the water was got away after about twenty boys had bathed. In the girls' room there were three or four ordinary baths, and the water was very black; the little girls were shivering while they were dressing. She thought if they bathed in the Japanese way it would be more economical, cleaner, and warmer. One bath-room for each person was the cleanest, most comfortable, and most ideal bath in the world, but that could not be supplied to every poor person. In England a hot bath costs 9d. or 1s., but in Japan they could have a hot bath for two farthings, and one farthing for a public bath, so that poor people could take a hot bath every day. In Japan the bath-room was about the size of half the platform, the floor being of smooth wood or sometimes stone, where the people washed themselves before they entered the large hot bath, six feet by ten feet, about chest high. They washed in tubs and then entered the large bath to warm themselves, but soap was only used with the small washing tubs. The cost was very small. A hot bath once a week was not sufficient for boys and girls, and in Japan they thought a bath was very necessary for boys and girls at the age of 14 or 16, the most important period to be dealt with. But they wanted clean clothing

as well as clean bodies. She thought every woman who was going to have a home should know how to make dresses for herself and her children. This question of home dress-making was very important from a hygienic point of view, not only because of saving expense, but because of cleanliness. In Japan home dress-making was one of the most important parts of domestic work. They considered it a shame to send to the dressmaker. They always made their dresses at home, and cleaned them at the end of every season; they were taken to pieces, washed, and made up again for another season. There was suggested the necessity for domestic art teachers in every girls' school. Of course in England the position of women was different, and ladies were doing more important work than dress-making. It was all very well for those who could afford new dresses or get the old ones cleaned, but it was very different with poor people. She thought this question of making dresses at home would help personal sanitation among the poor. The result might not be obtained in this generation, but if they worked on patiently they would have hope for the future.

MISS HOSKYNS ABRAHALL (Bristol) said that in the training colleges for secondary teachers there was little opportunity for child study. Unless biology largely entered into the school curriculum and training course, the knowledge of living things was hardly brought forward; so teachers only had a small idea of what was meant by a child. Therefore to secure this child study biology should form a portion of every school curriculum and training course. Obviously, too, it would be of use to those who were to become parents. That there was a lack of power of observation among teachers was well known, and was rather their misfortune than their fault; but if they were to succeed in training the children they must first and foremost study the children in the various phases of development.

PROF. A. BOSTOCK HILL (Birmingham) described an experiment in the way of training elementary teachers which had been carried on now for thirty years in the Saltley Training College, Warwickshire. Good results had been obtained with lectures on elementary physiology and hygiene as relating to healthy living in the home, and the healthy living and conduct of children at school. Owing to a crowded curriculum and limited time, they had to consider not what they would like to teach, but that which would give practical results. The main thing was to keep essentials before the students, viz., the importance of fresh air, cleanliness, types and qualities of food, and use of exercise. This could be done without going into the scientific aspect of the subject, doing an immense amount of good to the teachers, who in their turn would do good to the children. Less had been done for secondary teachers than for elementary teachers.

MRS. S. PLATT (London Day Training College) said the general concensus of opinion seemed to be that the practice of the laws of health was essential in

school life, but there seemed to be a wide difference of opinion as to who should infuse the needed atmosphere of hygiene in the school. There was a danger of the fact being forgotten that already, in the poorer districts of London, a large amount of voluntary work had been done by the teachers in the direction of inculcating in the children principles of right and clean living. The teacher must work in co-operation with the parent on the one hand, and with the skilled expert on the other. The need for loving sympathy with the children was pronounced, and no amount of academic knowledge would supply that sympathy. There was a danger in relying too much on the expert, and in her opinion the teacher in these matters must come first.

MRS. CLOUDSLEY BRERETON (Homerton College, Cambridge) said they had to consider what they could do with the money at their disposal. There was surely a wide field for medical women, and there must be available a large number of ladies qualified to undertake the work of resident doctor in training colleges combined with matronly duties. She described cases in which this method had been adopted with good results to all concerned, and explained the details connected with it.

MISS ALICE WOODS (Maria Grey Training College) expressed her fear lest the subject of hygiene should be added to the subjects of examination for teaching diplomas in secondary colleges. If the subject of hygiene was to be introduced it must be on broad and general lines. All their time should not be absorbed by study, and much could be done by attention to practical hygienic conditions. They must resist the perpetual temptation to expect more work than could possibly be done. While she hoped that the result of the conference would be a greatly increased interest in hygiene, she hoped it would not lead them to attempt to do too much and take up a proportion of time that was really excessive.

THE CHAIRMAN then put the resolution (page 189).

MR. A. MORGAN (Director of Education, Mountain Ash) urged that nothing should be done to alienate the sympathy of teachers in this matter. There were thousands of teachers between 40 and 60 years of age, and although he was not an obscurantist in the matter of hygiene, he thought it should not be unduly pressed upon such teachers. He moved as an amendment to insert the words "who desire to obtain such instruction" in clause (*b*), after the word "teachers."

The amendment was agreed to, and the resolution passed.

CONFERENCE ON SCHOOL HYGIENE.

Friday Afternoon, February 10th, 1905.

IECT: "TRAINING IN HYGIENE."—"Training of Scholars

ADDRESS

By The Rt. Revd. The LORD BISHOP OF HEREFORD.
(J. PERCIVAL, D.D.)

S this is the closing meeting of this very interesting conference, I feel that you will consider it only appropriate that the chairman's first d should be an expression of gratitude to The Royal Sanitary Institute their committee for having called the conference, which is likely to great deal of good. For my own part I desire also to take this oppor- ity of thanking the medical profession for the many indications they e shewn of late of their desire to act publicly and in conjunction more 1 hitherto by way of instructing the public.

In connection with our general education we have a colossal instance he waste which the nation has permitted to go on year after year for ng period: the waste of allowing elementary education to stop at age of twelve or thirteen years, so that the children have been in the it of going out into life and to live under we know not what influences, often no educational influence at all, while we were spending mous sums of money upon their education up to twelve or fourteen, all the devoted efforts of multitudes of lives have largely been thrown y. This is leading some of us to desire to see before long the State ng in hand a more general system of continuation schools for those lren who leave school so early.

Another instance of endless waste has been our comparative neglect of iene in all grades of education. I sometimes think that the neglect been greater in secondary schools, for instance, than in the elementary ols, of the conditions of health, and my feeling of this neglect makes very grateful to The Royal Sanitary Institute for this Conference, and all the other work which it is doing. Of course a great deal has been g on through the efforts of individuals all over the country in ifold forms, but we are beginning to feel the time has come for bined and public efforts scientifically conducted. It was only the

other day I had brought home to my mind the value of individual efforts, arising simply out of common sense and observation, in the way of improving the condition of life for our rural children, their health and their prospects afterwards. A clerical friend of mine was appointed to a living within no great distance of London, in one of the milk-producing districts, and when he went round his parish he found to his amazement that the cottage children of the parish could not obtain milk. The farmers would only sell their milk in bulk, so the children of that area were growing up without milk. My friend constituted himself a wholesale buyer of milk for the purpose required, went round his parish and found how much milk was needed by the cottagers for their children, and he bought it in bulk, and the cottagers came to his kitchen and had it every day in retail. Now, imagine the difference to the present and future health of those children on account of that little effort on the part of a wise incumbent. Or, again, he looked at the state of the teeth of his school children, and engaged a medical man to pay regular visits to his school to see to the health of his children, especially their teeth, and he told me he believed he would make an enormous difference to the lives of many of those children by that simple method of inspecting them in their youth. So much for the general question. This afternoon we have to deal with the question of the training of teachers in matters of hygiene. I will only say that, having had a great deal to do with both elementary and higher schools, I have a very strong feeling that we must go behind the schools to the homes, if we are to do anything like all the good which we desire to do. It is in the very earliest years that the seeds of mischief are sown in constitutions. It happens again and again that before a child goes to school its fate as regards bodily constitution and health is to a considerable extent determined. Therefore I say we must look far more than we have done hitherto, both in town and country, to the housing of our people. The great question of the health of the children in the slums of our cities is no doubt receiving every consideration. But the conditions of life in many of our country towns are for many children such as to make healthy manhood and womanhood, whether physical or moral, a very doubtful thing. Not long ago I had an opportunity of speaking to two of my incumbents on this very question. They have parishes of about 4,000 people. One of them, in answer to my enquiry, told me he thought in about 120 homes the children were growing up under conditions with regard to health and decency, which were unfit for the infancy and early years of growing childhood. The other incumbent, whose parish was somewhat

smaller, told me he thought he had quite as many. It is 2,300 years, or thereabouts, since Plato, as some of you remember, said that the young must be brought up in wholesome pastures, and that if they are to learn evil things at all they should be late learners of them—late learners of evil if at all—and we are still conning these very elementary problems of how to provide a wholesome atmosphere: what somebody called, I think, the other night, to bring the gospel of the body into the ordinary life of the English people. Well then, I say, I trust that more attention will be concentrated on the condition of the home, and then we shall have a better chance in the school. I said the schools were likely very soon to have almost universally good sanitary arrangements, and I hope good health teaching too; but as an old schoolmaster I should like also to say this: that inside the school by all means give decent, suitable, and good sanitary arrangements, but the real thing that counts, which is of the first and highest importance, the thing to which there is no second, is the personality of the teacher. Therefore I say we have to instruct and inspire our teachers. We have to do all we can to encourage our teachers. Why, the teacher in our rural parishes is very often the most influential person there. I suppose it is just the same in great cities like this. The teachers have the children in front of them through all their plastic years—hour by hour and day by day; and if they are well inspired and duly instructed I cannot but hope, ladies and gentlemen, that more and more by their impressing their children with right ideas, not only as to the religious and moral life, but about such things as cleanliness and fresh air, and eating and drinking and all the rest, they will send out those children with new tastes and new habits which will make the next generation a new race of a higher type than we have had before.

THE TRAINING OF SCHOLARS.

By Professor FINDLAY, M.A.
Victoria University of Manchester.

WE are to spend this afternoon in considering what can be done by way of direct guidance of our children's lives in matters of health and physical development. In previous sessions we have inquired what can be done *for* them : now we are to ask, whether our scholars themselves can be trained to think, or feel, or act rightly in these matters, which are pressing so anxiously upon the attention of their elders. After all, it is said, the children are not only the chief sufferers by the present state of things ; but they in due course will take our place, and if we desire them to complete the reforms which we initiate we must gain their attention and interest while they are still pliable. This plea is inevitable; every movement in social or political reform tries to lay its hand upon the children, and looks to the school to help us towards the millenium. Grown men and women will not listen to us ; let us capture their children!

I say these efforts are inevitable, for every man desires that his offspring shall grow up after his own image : that his children shall be moved by the influences which are stirring within himself. When, however, we come to inquire as to the likelihood of success or failure in such efforts, we are liable to some discouragement. Experience has taught all wise parents that there is a strict limit to the amount of direct influence that we can exercise over our children's lives :—they live a life apart from ours, and in spite of all the power of suggestion, or of direct instruction, we cannot force them to accept our ideal; and if this is true of the home, it is still more true of the school, for the teacher is, and must be (except in the rarest situations) a comparative stranger to his scholars. We find, in fact, that those fully-formed, strenuous convictions which stir us, *as adults,* to action, take an entirely different shape when transformed into material suited to the wholly different being that we call the infant, the child, the schoolboy.

I venture to open our discussion with these words of warning, because it is evident that they are needed. The proposal to teach hygiene in the schools is no novelty; it was one of the chief themes of Herbert Spencer

in those famous four chapters which have become an educational classic. One result of his exhortation was the South Kensington programme for the teaching of elementary physiology, under which thousands of teachers and millions of their scholars gained certificates and grants for this subject. And, although neither physiology nor hygiene has ever been compulsory, the instruction has been sufficiently widespread in the field of elementary education to enable us to judge of the results. I believe that the general verdict is failure. I doubt whether the South Kensington authorities to-day would agree that any adequate return for that great expenditure of time and money had resulted from those countless lessons about the human body, given for the purpose of earning grants and certificates.

The need, however, is as great as ever, indeed, it is far greater; for the conditions of humble life in our great cities are such that, somehow or other, a remedy must be found for social evils, and if the teachers *can* help to find a remedy their help must be secured. Hence we find that Herbert Spencer's proposals, in a new shape, are being put forward by the British Medical Association. When the philosopher wrote his chapters (more than thirty years ago) medical men had little concern with the schools, and they cannot be blamed for waiting until 1904 to take up the cause which he advocated. During the interval the medical profession has been brought much more closely into touch with school life; first of all in the secondary (large public boarding) schools, and more recently in the elementary schools, the medical officer has found a place; hence the recent petition to the Board of Education, which is the direct outcome of the activity of medical officers, who undertake, in many neighbourhoods, a certain responsibility for elementary schools. This association between medicine and teaching is most valuable and indispensable, and, if I might do so without impertinence, I should like to express the gratitude of my profession for the interest which medical men are now taking in school life, and for the help which they are rendering to the cause of educational reform, not only in the field which claims our attention at this conference, but by the example they offer to teachers in scientific habits and modes of thought. The teaching profession lacks more than aught else at the present day these very habits and ways: we are learning them in part by association with a profession that is trained in scientific method.

I appeal therefore with some confidence to medical men when I ask them to adopt a cautious attitude in dealing with the school curriculum. They have no professional experience of the relation of cause and effect in this realm of things. Herbert Spencer was equally uninformed, and

the failure of his proposals was due to neglect of the conditions under which teaching and school life can be organized to fulfil the aims he proposed. These aims are stated afresh, in most admirable terms, in the petition presented to Lord Londonderry last July: that "the rising generation should *appreciate* from childhood the nature of those influences which injure physical and mental health."

Every thoughtful person must endorse this desire, and heartily welcome so earnest an expression of the ideal. Let us, however, recognize at once that it is an ideal, and an ideal which contains the seed of a revolution, of a social and political revolution. This, I think, should be stated without disguise. If, as a result of the petitioners' desire, some machinery were devised by which the mass of dirty, underfed children around us were led to appreciate the blessings which we enjoy, does any one suppose that they would be content to remain without these blessings? At present, by a Providence which we can only regard as merciful, they are comparatively happy under physical conditions which would be unbearable to the members of this conference. If we propose to give them insight into a better and fairer physical existence, we must surrender something more, and that surrender means social revolution. We do not fear revolution unless it comes too suddenly; but I venture to point to the sequel, since it is only one other evidence of the intimate bond that exists between sociology and education.

How, then, is this appreciation to be attained? The petition itself is cautious, and does not commit itself to any method; but from some of the speeches addressed to Lord Londonderry, and from other recent utterances,* it is to be feared that some medical men are urging us to repeat the errors made by South Kensington in the past, without basing their demands as to teaching on successful practice or personal experience. They merely point to what is being done in other countries, such as our own colonies and the United States.

I have not been able to make inquiry as to the course of education in British Colonies, but so far as the United States are concerned, there is no warrant for the belief that the millions of children mentioned in the petition are much the better for the superficial text-book recitations prescribed by State authorities. The views, not only of teachers, but of eminent superintendents and of scientific men,† bear out the impression that a teacher would naturally feel on learning that these regulations were

* *Vide* the columns of the *British Medical Journal* during 1904.

† *Vide* Annual Report of the Bureau of Education, 1900, 1901, 1902, and Proceedings of the National Education Association, 1900, 1901, 1902, etc.

adopted as a result of a very courageous but very reckless agitation by the Women's Total Abstinence Union. When we are told that infants imbibe hygienic and temperance ideas from books "written in words of one or two syllables, such that the information can be absorbed by the smallest child of school age," we know that the programme is folly. "Beer is bad for ba-by" may be a good lesson in phonics, but it is ridiculous to suppose that American children absorb information through these channels. Medical men, whether in England or America, do not seek to train their own children in healthy habits or thoughts by this sort of formal instruction, and upon reflection they are not likely to press the schools to adopt devices which they have not tested.

Further, I do not believe that those who signed this petition to the Board of Education really desire to add to the intellectual burden of children; for the medical profession is constantly and most justly warning us of the subtle dangers involved by pushing the young mind to excess in intellectual precocity. Dr. Hyslop,* for example, has recently uttered a grave warning as to the increase of insanity which he attributes in part to the "intemperate exercise of the brain functions in both psychical and motor regions during the earlier years of development." Hence, whatever training is proposed for our scholars in order to help them to appreciate the importance of hygiene, I feel sure that medical men will not desire us to add a new subject to the curriculum by way of formal intellectual instruction. On the contrary, I believe that if the hygiene be introduced into our schools on sound lines, on principles based upon the nature and needs of our scholars, it should contribute not to further over-pressure, but to some lightening of the mental load under which our scholars, if Dr. Hyslop be right, are suffering.

Let me briefly indicate what these principles comprise:—

(1) Very varied methods must be adopted, in hygiene as in all other school pursuits, according to the stage of development of the scholar. The infant up to seven years of age, the child up to eleven or twelve, the adolescent from fourteen onwards, each needs a different mode of approach. They live in different worlds, and must be trained each after their kind. The crude notion of producing a graduated series of text-books to meet these varying needs is the merest trifling with young human nature, and is unworthy of the name of education.

(2) All real appreciation of science, of the phenomena of the physical world, depends not upon books or talk, but upon personal sense-experience. If you want to appreciate fresh air you must smell it; good food

* *British Medical Journal*, November 19, 1904.

must be tasted. The talking may come afterwards, as an expansion of sense-experience; the teacher always finds it difficult to make sure that such experience has been attained; and in relation to children who pass their lives in unhygienic surroundings the difficulties are obvious.

(3) *Young* children's thinking is evanescent and superficial. They are curious and ready to ask questions, but their powers are not seriously aided or developed by formal attention to reasoned argument. They are active, imitative, open to suggestion, eager to do things without any reason, if you bid them. Hence you can help them to form hygienic *habits* if you are allowed to train them in doing hygienic acts. But you cannot train them to be hygienic (even in thought) for future needs, since

(4) The child lives in the present, and takes no thought for the morrow; give him habits by practice, and he *cannot* shed them; try to give him notions for future conduct, and he will learn them and forget them "standard" by "standard." From these homely facts relating to child nature we trace others :—

(5) The aim in teaching hygiene, especially when associated with the teaching of temperance, is moral; it is to lead to right conduct. Now, the child grows in conduct, as in all else, from the exercise of right doing. He will be a sober man if he learns to control his greed in childhood; he will not be greatly influenced by reading or hearing that alcohol is a poison. The sweet shops encourage greed and intemperance in the child, and although the tastes may change, habits of excess may be fatally fixed. If righteousness could be taught by text-books there would be few drunkards. The influence of the home and of the teacher, the standards set by society, these are the traceable causes which mainly affect the growth of character in our scholars.

(6) If hygiene is to be primarily a collection of habits in the scholar's nature, he must practice hygiene in the school, and *the field for hygienic exercise should be found in the life of school.* That is to say, the school building itself, its ventilation, its dust, its cloak-room, its back premises, must be made a matter of hygienic care, first to the teachers, and through them to the scholars.

(7) When the scholar is old enough to make a formal study of any branch of hygiene, he should be taught with the same direct appeal to sense-experience that we insist upon in other branches of science, and only those portions of the study should be selected which are capable of practical treatment, followed by some immediate personal application.

(8) In all matters relating to the direct conduct of the scholar's life,

the school cannot disregard the standard of home life. It is easy to create a conflict, not only between school and home, but between parents and children. If this sanitary crusade is to be effective, the home as well as the children will be reformed, and the teacher will therefore need to gain the sympathy of parents before he can achieve his aim. By way of simple illustration: As long as parents drink their daily tea after it has stood on the hob for half an hour, teachers will not convince the children that the practice is injurious. And this applies to drinks more dangerous than tea!

Now on the basis of principles such as this, it seems feasible to propose some improvements in the practice of our elementary schools which would tend to hygienic reform. But it must be premised that any such proposals depend upon their acceptance by teachers. That is, upon the adoption of improved methods of training for teachers discussed this morning. It is true that one enthusiastic reformer, Dr. Heron,* would seek for the aid of young doctors as propagandists of a new creed, but his proposals are impracticable. Even if the number of young medical men lacking employment were greatly increased, still they cannot do the work of the teacher. I do not assert this in any spirit of trades unionism. On the contrary, if the introduction of amateur medical lessons in the classes of elementary schools could achieve the ends proposed, I for one would gladly welcome such an addition to the ranks of the teaching profession; but, if the earlier arguments of this paper are accepted, I do not need to repeat the grounds on which I should regard such efforts as hopeless.

Assuming then that a body of teachers in any district are prepared to take up this work with devotion, and are adequately supported by public authorities, I think that there is sufficient experience, from work already done, to justify us in sketching a plan of operations somewhat as follows:—

I. *The Secondary School.*—So far as training is concerned, the bulk of scholars in the secondary school ought not to require training by teachers in habits of hygiene. If the home has not done what is requisite for

NOTE.—A sharp distinction should be maintained throughout between *training* in right habits and *instruction* in hygienic principles. Both are desirable, but it by no means follows that because the one is aimed at, the other will be attained. To give so-called object-lessons to young people, *i.e.*, to talk and demonstrate without taking measures to secure any prompt realization of the ideas in personal experience, is, as we have seen, a waste of power.

* Address to Society of Medical Officers of Health, *Public Health*, November, 1904.

social purposes, then the scholar has no claim to the privilege of secondary education. This is true certainly so far as boys are concerned, but with reference to girls the case is different, since the woman has closer relationship to domestic hygiene than the man. Women teachers warn us against the negative results of an education, both in boarding and in day schools, in which girls are largely separated from domestic interests and experiences during the most impressionable years of life.

With reference to formal instruction I feel every confidence in supporting the proposals made by Miss Ravenhill on the basis of her experience in America, proposals which I gather have been adopted to some extent, with the approval of South Kensington, in a secondary school in Bradford. It is now agreed on all hands that practical science shall be a regular part of the curriculum of every good secondary school for at least three hours per week in a course of instruction extending over four years, from the age of 12 to 16. Now it is also agreed that the first years of this course shall be mainly concerned with elementary physics closely associated with practical mathematics, and that some portions of elementary chemistry shall find a place in the later years. But beyond these requirements there is no consensus of opinion. Some specialists desire to push the scholar on to more advanced chemistry with a view to precocious distinction in scholarship competitions, but all the distinguished chemists deprecate such early devotion to chemistry. It seems to me, therefore, that a practical course in elementary physiology, with the obvious practical hygienic applications, could well occupy at least one-fourth of this four years' course. It should come in the later years, since it presupposes an acquaintance with some of the elementary notions of physics and chemistry.* The only objection to be raised would be on the score of expense in microscopes and laboratory equipment: but this is not a serious difficulty.

An additional reason for introducing this branch of elementary science is afforded in the case of secondary schools which are preparing pupil teachers. If hygiene is to take its proper place in the professional training colleges, the students must come prepared with a mind ready to appreciate these principles by a proper groundwork in practical physiology.

Such a course as this is equally valuable for boys and for girls, and at fifteen they are old enough to appreciate the relation of cause and effect

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* For examples of successful school work see *Peabody:* Laboratory Exercises in Physiology (H. Holt & Co., New York). *Brown:* Physiology for the Laboratory (London: Ginn & Co.).

involved in applying the phenomena of function in the human frame to the problems of personal and civic hygiene.

I am aware that this proposal will meet with considerable opposition from masters and mistresses in many secondary and technical schools whom our Universities have trained on a somewhat narrow diet of "Chemistry and Physics"; but science is not an end in itself, and its teachers will not forget the arguments by which they first gained so strong a hold on the schools: they were welcomed because they claimed to be needed for the practical purposes of life, and public opinion supported their claim. If this same urgent public need now demands that they should modify the curriculum, and displace some of the chemistry and physics by physiology and hygiene, we may hope that they will consider the situation impartially.

II. *The Higher Elementary School.*—The same course of reasoning applies to the situation in the four-year course of the higher elementary school. The whole of the last year of that course might well be given to practical physiology and hygiene, as a sequel to the work in elementary physics and chemistry in the previous three years.

III. *Evening Continuation Schools.*—I omit these from consideration, not because they are unimportant, but because the needs of every such school will vary according to the special type of scholars in attendance.

IV. *The Elementary School.*—Let us first consider formal instruction, since that is the simpler problem. From what has been said above, it will be gathered that I wholly dissent from proposals to serve up hygiene as a standing dish in all the standards down to the infant school. Specialists and enthusiasts for a single branch of study always tend to defeat their own aims by making such universal demands. I advise, rather, that the subject be delayed till the last year of school life, to Standard VI., when the scholar is already looking forward to stepping out into practical life, and is old enough to appreciate a little the importance of the issues placed before him. And having adopted it for, say, Standard VI., I would not relegate it to a few object lessons, but I would treat it on the "intensive" plan, giving at least one lesson daily to the work,* thus securing during that one year as much time to the study as it would receive under the plan which dissipates the study over eight years. This year of work on personal and civic hygiene would so attract the scholar's attention that his mind would be forced to acquire a strong interest in it. If I could not

* These lessons would include quantitative work which could be classed, if need be, as arithmetic, and work in reading and writing which could be classed under those headings.

secure a proper laboratory,* I would devise means for practical work at the scholars' desks. I would take my scholars on visits out of doors; I would closely connect my work with personal "training" (see below), and seek to stimulate, not only the senses and the imagination, but the motor activities of my scholars in behalf of what must be, if it is to be effective, a new crusade, a reformation in the circle of ideas and conduct, of my scholars. This, as is obvious, is theory, not practice. I have not gone through this experience in a course of instruction, but I base the proposal on pedagogic principles which have proved their value in other branches of teaching.

Before Standard VI. I would not bring hygienic problems formally before my scholars' minds, except when the course of instruction plainly afforded opportunity for application. Thus in Bible lessons, no one can read the Gospel story without observing the effects of disease;† in Nature study, even young children can make practical studies of the external features of animals—the teeth provide a body of excellent lessons both in structure and in function; the scholar can pass from function to practical application and to rouse in a young child some appreciation of the need for keeping his own teeth clean.

And here it should be observed that when interest and care are aroused in some simple branch of hygiene, the foundation is being laid for a wider intellectual interest in other branches. It is wearisome to the child to have to make a formal comprehensive review of the entire science; but if you catch on to his mind at a few points, and, above all, if at these points you manage to turn interest into activity, you have started the hygienic point of view. If your teacher has the root of the matter in him, he can be trusted to find the best road to reach his scholars' interests. No syllabus planned from outside can be of use at this point.

I have reserved training in hygienic habits to the last because it presents the greatest difficulties. Let me indicate a few of these:—(1) There are many social grades of elementary school; recommendations which would apply to a school in Soho are entirely out of place in a school such as the Fleet Road School in Hampstead. (2) The effect of fifty years of elementary education is to alienate both inspector, teacher, and scholar from domestic ‡ service, from the so-called menial duties of

* It must be remembered also that what is practical method in one science, may be very artificial in another. Practical hygiene can scarcely be learned in a laboratory, for experience of hygienic ideas can only be obtained practically in the places where hygienic laws are in operation.

† The application here is not far to seek, for teacher as well as scholar: "He that is faithful in that which is least (in the care of the human body) is faithful also in much."

‡ So long as housemaids and cooks are despised as a lower social class, it is hopeless to expect hygiene to be respected by children who attend elementary schools.

daily life; intellectual pursuits and callings are the goal of the talent that the school produces; this is the penalty that we pay for having accepted the traditions of elementary education from the grammar school and the university. (3) Division of labour and of interest in modern life leads all young people to regard civic hygiene (and to a large extent domestic hygiene) as a matter outside their duty. The child finds the street, the school-room, the home all kept clean *for* him; he does not reason about it, but he accepts it as a natural condition of his life, and, as he grows up, he expects it so to continue. (4) These conditions produce startling results in the infant classes of schools in slum neighbourhoods, where the little ones are being taught contrary to every canon of medical or pedagogic science to strain their eyes and their brains in reading and fine sewing,* when they ought to be learning habits of decency and cleanliness. I know there are exceptions, and the teachers, in any event, are not to blame; but the fact can scarcely be disputed.

For a remedy, therefore, it appears to me that measures of a more radical nature than any yet proposed would be required. So far as infant schools are concerned, I believe that the proposal of Mrs. Miall and of Miss Phillips, to convert them into nursery schools, is sound; not replacing the teacher by a nurse, but by entrusting the teacher with the duties, eliciting from her the sympathies of a foster-mother. For the higher standards I would go just so far as public opinion would permit in training children in the hygienic care of the school and of the class-room. In this as in other directions we have much to learn from the Day Industrial Schools. Those who know the work done, for example, in the Council School off Drury Lane will appreciate what I mean. A lad of twelve whose mother is out at work all day can be trained, and has been trained by Mr. Humphreys to keep the home tidy and clean, because he has learned hygienic habits at school. If once we realise that reform depends upon active experience, rather than upon books or talks to children, we shall have set our feet upon the road to genuine reform.

I have attempted to cover a large field of inquiry in a short space, and have had to omit many illustrations which would have made the exposition more comprehensible. It would be easy to show, I think, how the elementary schools (in poor districts where the needs of reform are so acutely felt) might be made a place of permanent exercise for all the simple hygienic virtues in the cooking of plain food for cheap meals, in the prevention of waste in food, in attention to fresh air, in care for

* *British Medical Journal*, December 10th, 1904, p. 1595.

clothes by practising simple mending, in sweeping, dusting, and the care of the school building, both in the front and the back premises. Pictures and decorations are well in their place, but cleanliness is better. These things ought ye to have done, but not to leave the other undone! If the public opinion of parents would permit children to share in these simple, natural activities, teachers, I feel sure, would be ready to lead in the reform. There is no other road except that old and narrow way that leads to righteousness: he that "doeth the will" shall "know the doctrine."

I ought, in conclusion, to thank Miss Ravenhill for supplying me with references to literature which has enabled me to undertake this paper. The best source of information is in the journals of The Royal Sanitary Institute since 1897, especially papers by Prof. Sherrington and Dr. Kerr, and the invaluable report by Miss Ravenhill herself on what is being done in the United States. Also the account by Miss Beszant, of what is being done in the Belle Vue Science School, Bradford (vol. xxiv., p. 790). If it is intended that any practical outcome should result from this conference, I would venture to suggest that a resolution might be adopted, asking the different associations of teachers to consider what steps can be taken in various types of schools to promote the ends of hygienic reform. But, while I think that teachers will not be unwilling to second the efforts of sanitary reformers, we cannot avoid looking further ahead and recognising that the teacher depends upon the currents of public opinion: the reforms which underlie this movement are concerned not only with the domestic habits of the poor, but with the whole structure of social life and conduct, of which the school, with its virtues and its faults, is but a mirror.

TRAINING OF SCHOLARS IN HYGIENE.

By Prof. A. BOSTOCK HILL, M.D., M.Sc., F.I.C., D.P.H.

I WOULD urge that if there is to be secured an increase in general sanitation and hygienic knowledge among the community, this can only be done by teaching the children. Only in this way can real progress be made against adult ignorance and prejudice, for not only will they affect the lives of those around them, but when grown up will put in practice those things they have learnt at school and follow good habits. As an instance of what can be done in this direction, I might mention the system of health visitors that appertains in Warwickshire, and the good results following simple health talks with the children. Simple lessons in cleanliness and the bad effects of dirt on health could be followed by more special teaching of a physiological character, such as the structure of the skin. The children should be taught that this is not a mere leather covering for the body, like clothes, but rather that it is an organ which is intimately associated with health by assuring the disposal of waste matter so necessary to healthy living. This method, I think, is easy of accomplishment. It is really surprising how much children can retain of a lecture of this sort. I would lay special stress on the importance of teaching the value of fresh air. What is wanted more than anything else in this country is to teach the cult of the open window. This can largely be done by example in school, particularly where schools are not mechanically ventilated. As the children get older they may be taught elementary hygiene of the type found in the simpler text-books, and I am quite sure an immense amount of good will result, and, in fact, that the nation itself will be enabled, by a conservation of life which is now lost through want of domestic knowledge, to minimize those evils with which we are threatened by a constant diminution of the birth-rate.

TRAINING OF SCHOLARS IN HYGIENE.

By Miss S. L. BESZANT.

THE importance attached to the teaching of hygiene during recent years has led to its adoption as a school subject in some elementary and secondary schools; therefore, in this short paper I intend to deal with the training of scholars in hygiene in the Elementary School; and in the Secondary School.

I. *The Elementary School.*—The teaching of hygiene should be compulsory, at least for all girls, in elementary schools. This does not necessarily mean the addition of a new subject to the school curriculum, because in the new code provision is made for it in No. 3 of the subjects specified for instruction, which reads as follows:—"Knowledge of the common phenomena of the external world, with special reference to the formation of a habit of intelligent and accurate observation, and to the application of that habit—in conjunction with simple forms of experiment—in the daily life and surroundings of the scholars." Now surely the daily life and surroundings of the scholars chiefly consist of the home, the school, the village, town or city.

The training in hygiene in the elementary school resolves itself into three parts:—1. Elementary experimental science with a practical bearing upon hygiene. 2. A practical application of hygiene to school life. 3. A practical acquaintance with the applied arts of cookery, cleaning, arrangement of daily work, laundry work, keeping household accounts, sick nursing, ambulance work, the care of young children, and household sewing.

1. This teaching should be practical from the beginning as far as possible, and on the whole inductive, the object being suggestive on the part of the teacher, leading the pupils up to general principles. In the elementary part of my own school as well as in many others in Bradford, the following methods are employed:—

(*a*) The teacher exhibits and allows the girls to handle and examine the objects to be studied, or by means of experiments, shows the phenomena which she wishes the children to notice.

(*b*) The girls are then encouraged to describe in their own words, and as minutely as possible, what they see, carefully distinguishing between essential and non-essential points.

(*c*) The girls are then led to make simple inferences from the facts observed, such inferences being confirmed or disproved by further experiments until they arrive at the comprehension of some general truth.

(*d*) Subsequent to the experimental lesson, a summary is written, and diagrams drawn under the guidance of the teacher. The notes are not dictated, a training in correct expression forms a part of each lesson, and in this way English subjects are aided by the science lessons.

The apparatus required is simple and inexpensive. A laboratory is not essential. An ordinary class room, fitted with trestle table, rubber tubing connected with gas pendant, etc., is suitable for teaching purposes. Lists of material for practical work can be obtained from the list of apparatus for teaching chemistry, hygiene and the elementary science of common life issued by the Board of Education. Plenty of ideas for practical elementary science, bearing upon hygiene, may be derived from the Board of Education syllabus in hygiene, animal physiology, and the elementary science of common life.

This training is suitable for boys as well as girls. The instruction should be given by the staff of the ordinary school, rather than by peripatetic teachers. Hygiene is a subject in which the teacher herself exerts much influence on the scholars, and this is not effected by peripatetic teachers. The teacher should be an object lesson in personal hygiene, in dress, manners, habits, speech, and self-control. As a matter of organisation, I find that it is advisable to arrange for one member of the staff, specially qualified, to take the experimental lesson, the class teacher being present, so that she can supervise the girls' written notes, and utilise the various points in other lessons.

No text books should be used by the scholars. I would not use domestic economy or object lesson readers. A good reference library should, however, be available for the teacher.

2. Monitresses, elected by ballot by the scholars, can be made responsible for opening windows during recreation, etc., tidiness of class rooms, lobbies, and cupboards, during school hours. If this work is unsatisfactorily done, the girls quickly see the necessity for electing others who are more reliable. The connection between school and municipal hygiene can then be explained.

II. *Hygiene in the Secondary Schools.*—The difficulty connected with the teaching of hygiene and its specially correlated subject, physiology, in the schools is being gradually removed, and the teaching of physiology and hygiene is being extended in secondary schools of both types.

It may be interesting to those present to know what is possible in a girls' secondary school of the *A* type. The science course, extending

through four years, consists of theoretical and practical chemistry, theoretical and practical physiology and hygiene, and includes such instruction in physics as may be necessary for the proper study of the other subjects. The physiology is treated in a scientific manner. The girls experiment, observe, draw inferences, and make their own summaries under the guidance of the teacher. The subject is popular with the girls, and no squeamishness or hysteria is shown at the sight of blood, of a sheep's heart, or of a simple dissection. We do not plunge at once into dissection, but start with what the girls know concerning respiration, viz., that they breathe regularly. Then comes the question: Is there any difference between inspired and expired air? This is found out experimentally. This leads to other questions: Where do these changes take place? and, How do they take place? These lead to examination of organs in the thorax of the rabbit, and the naked-eye appearance of the sheep's lung, etc.

At every possible point reference is made to the hygiene of the body and surroundings. The physiological syllabus is supplemented by more detailed and advanced hygiene, treated experimentally. The subjects of food and adulteration, water supply, the dwelling (including soils and the construction of foundations), sanitary fittings, ventilation, heating, and personal hygiene are dealt with.

Practical work in some form of housewifery should supplement this instruction, as in elementary schools, and in this class of school specially the ignorance and prejudices of parents have sometimes to be overcome. They consider it unnecessary that their children should receive any training in household matters.

In conclusion, I beg to place two points before Education Authorities:—

1. That if the training in hygiene is to be thorough, a very serious duty devolves upon local education committees with regard to the improvement of school buildings, and the suitability of schoolkeepers for their post.

2. That as a part of the equipment of the museums of each town or city, a hygienic section should be provided; not a mere collection of models, but each part somewhat on the lines laid down by D. P. H. in his article contributed to the *Museums Journal*,* on hygiene museums. Such collections would be of great value to schools, and would also serve to remove some of the ignorance and prejudices of parents.

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* *Museums Journal*, Vol. I., Parts 6, 8, 9, 12. 1902. Dulau & Co.

THE PRESENT POSITION ASSIGNED TO HYGIENE TEACHING IN PRIMARY & SECONDARY SCHOOLS.

By Miss ALICE RAVENHILL
(FELLOW),
And Miss ETHEL HEAP.

IN response to a suggestion made by Professor Findlay, the following information has been collected as to the position at present assigned by a selection of representative educational authorities to the teaching in primary and secondary schools of subjects bearing directly upon the hygiene of human life.

In order to obtain valuable and accurate results, application was made to the Education Committees of certain county councils and county boroughs and to the heads of some of the public secondary schools throughout Great Britain, the majority, however, being situated in England. We desire to acknowledge the great courtesy with which the inquiry was received by all to whom it was addressed, and at the same time must express our indebtedness for some information to the results of the inquiries made by Sub-committee 5 of the Education Section of the British Association "On the Conditions of Health in Education."

In the case of local education authorities, information was sought under the following heads:—

(*a*) Is any systematic instruction given in the schools under your direction on the elementary structure, functions, and requirements of the human body?

(*b*) Is this instruction confined to girls only and included in domestic economy?

(*c*) Do boys receive any teaching in civics which treats of elementary sanitation?

The heads of secondary schools were asked whether any systematic instruction was given in their schools on—

1. Civic duties,
2. The hygienic conduct of life,
3. The elementary structure, functions, and requirements of the human body.

not less well that every member of those classes from which naturally spring the nation's land- and property-owners, its legislators and its administrators, should also be, not only themselves individually healthy and health-loving, able in this respect, too, to set a good example before their fellows and their inferiors in the social scale, but that they should be equipped with a knowledge of so much hygienic truth as will enable them at least to aid intelligently in framing and wisely administering the sanitary enactments for which they will become responsible; and properly to supervise the homes, the factories, the estates of which they will some day become the heads. Those who will have to govern must not know less of their duties than those who are to be governed. And from both these points of view I believe there can be no question but that the claim of the secondary scholar is not one whit less urgent than that of his primary contemporary. If personal ignorance of what he should do be the dominant appealing note in the one case, rusting opportunities and personal ignorance of what he will have to know is that in the other.

As regards practical details, the main difficulties in both kinds of schools centre round the questions of teachers and the time available for teaching. I think one must admit that in neither case can it be expected that this serious addition to the national curriculum shall be launched in its final shape, and with full equipment. Its details must to a considerable extent be evolved in and by the working of the scheme itself. At the present moment, secondary schools could not furnish any body of trained instructors in hygiene, not even to the very moderate extent which the primary schools already possess. But they have ready to their hands material capable of being moulded to that end, and fairly equal to laying the foundation of a sound system of instruction in elementary hygiene. Science-masters, medical officers of schools, the local medical officers of health, from these might surely be drawn in the first instance the pioneer-instructors, until such time as a real demand had been overtaken by the inevitably-begotten supply. Time is a question of no less importance; for the regular teaching hours of the pupils are, even now, at least as long as it is wise to make them; and, moreover, many lads are nowadays compelled to give up a portion of their nominal recreation-hours to private tuition. Yet by forming groups of senior and junior classes, according to the number of the pupils in the school, it should not be impossible to give the members of each group one hour per week in this subject. And it should not be forgotten that, in the course of two or three years, the pupils coming from preparatory schools will have been already grounded in the rudiments of elementary hygiene, on the assumption that these

junior schools are not to be excluded from a share in the benefits already secured to young children in elementary schools.

Nor do I believe that such teaching would or should be of a kind likely to entail special mental strain upon the learners. Much of it, indeed, will be but an interesting explanation of facts and circumstances with which the pupil is already well familiar. During the last 30 years I have had some opportunities of gaining practical experience in the matter; for three years it was my daily duty to give lectures of this kind to lads varying in age from 14 to 19 years; and I have more than once known a whole school of several hundred boys volunteer to give up an hour of their play-time once or twice a week for several weeks in succession, in order to receive instruction in this way. All children can easily be interested in things which deal so intimately with their own bodies, and with their immediate surroundings. The subject is one which lends itself with peculiar readiness and ease to simple forms of demonstration and illustration on the persons of the pupils themselves. And a subject which really interests a learner is one which it really least fatigues him to learn.

The question of expense is also to be taken into account, though I hold this to be less of an objection, believing, as I do, that its cost would be eventually repaid many times over by the merely material returns secured.

THE TRAINING OF SCHOLARS IN THE PRACTICE AND PRINCIPLES OF HYGIENE.

By HERBERT W. G. MACLEOD, B.Sc., M.D., M.S., D.P.H.Camb. & Lond.
Medical Officer of Health, late H. M.'s I. M. S.; Lecturer on Hygiene to the London County Council: Fellow of the Incorporated Society of Medical Officers of Health.
(MEMBER.)

THE success of training the young is to be tested by the condition of the nation in after years. That such education should be based on sound principles is a self-evident fact. It is necessary for the prosperity of a nation not only that the memory of the people be well stored in general information, but also with the essentials of the art of living healthily, so that habits may be formed which will remain as capital to be drawn on when the work of life is to be done.

During child-life there is a progressive development of the physical, mental, and moral powers; and it is too true that, under unhealthy surroundings (caused not only by poverty, overcrowding, and vice, but due also to bad ventilation, improper feeding, maternal neglect, and to ignorance of the elementary principles of hygiene), these natural processes of life become perverted, and end in physical, mental, and moral degeneration.

This applies chiefly to the poorer classes, but is true of all grades of society, because our schools and colleges as a body have, hitherto, not only failed, but have seemed to be unwilling to realise the importance of instruction in the subject of health.

Children, if brought up under hygiene methods, will be predisposed to follow them through life. We all know by personal observation and experience how early ideas, slowly and systematically developed, become ingrained in one's nature, and are with difficulty removed.

Home is the child's first educational centre. If mothers, nurses, and governesses were properly trained to carry out the simplest rules of health, how great a gain it would be to the community! That an appalling state

of ignorance exists among them is well known to the medical profession, but, unfortunately, not to the public.

A direct result of this want of knowledge is the enormous loss of infant-life which goes on, practically unchecked, from year to year, although so high a rate of mortality is preventable. It is demanded, therefore, that those who have the care of the young should be properly trained to undertake their responsibilities. Mothers and nurses are particularly liable to be influenced by ancient tradition and custom, and to strenuously resent any interference with methods which were followed when they were children.

How important it is, then, that such opposition should be swept away by proper training in the rearing of the young.

There are many waifs to whom the word home conveys no meaning; to them home-life is unknown in the sense we attach to it. The rooms they live in, the treatment they receive, and the habits they acquire are of the worst possible kind. It is these children, the inhabitants of the alleys in England and of the closes in Scotland, who most need hygienic treatment and instruction. In school alone can they be taught what cleanliness means. Home-instruction ought to supplement that given at school, but in such cases this is impossible; the children are often taught to disregard what they have heard at school, and they grow accustomed to the unwholesome conditions of life which they experience daily. Dirty habits grow on them, and if denounced and punished at school, they carry them on at home with impunity. How are these difficulties to be met? For young children, incapable of reasoning, the best course is to teach them by example and precept, and to appeal to their better feelings. To be harsh with them before, or after, they know the nature of their offence is to be unkind and unreasonable.

Let them be taught to follow a better and a *cleaner* way. In most cases a few words kindly spoken will carry more weight than threats and punishment. Practical instruction is in all cases the key-note of success. Impressions by sight and sounds are more lasting and more readily remembered than any other, and it is far more easy to teach cleanliness by demonstrating the advantages of clean faces, clean hands, clean clothing, slates, and books than by constantly finding fault when "they know not what they do."

In children above ten years of age the mind should be more extensively trained to observe and reason for itself. It is advisable to teach them, by object-lessons and demonstrations, simple methods of keeping a room properly ventilated and clean. By these means their interest and

co-operation are stimulated. One of the best ways to arrest the attention either of children or of adults is by drawings and lantern-slides. They are more effective if suitably coloured. Such pictures explain the situation at a glance, hence their value.

All schools should have a series of coloured lantern-slides drawn to scale, illustrating simple methods of warming, ventilation, water-supply, and drainage suitable for small houses. They would be most useful for young people of fifteen or sixteen. Girls at that age should be taught to realise the dangers of improper diet for children, and they must be instructed how to propose simple nourishing foods for them, and how to apply the practical rules of hygiene to infant life.

For children old enough to read and write it is suggested that precepts to be transcribed into copy-books are useful. But this learning by rote is an unreliable method, and does not carry the weight of authority.

I think it would be going too far to bring bacteriology into our school curriculum, as suggested by some. It is quite beyond the mark. We must, in advocating our cause, be careful not to err in exceeding our limits. We desire to teach the public to live healthily and wisely. We do not intend to make them past masters in the science of hygiene; and false ideas of the importance of one's qualifications are easily disseminated and do no good. What we want to afford is practical instruction which will be readily followed in the routine of daily life by all classes of the public. When this point is reached our object is attained. What results will accrue? It is obvious that the benefit will be a national one. With hygiene of the individual, of the house and its surroundings, there can but ensue a healthier condition of existence—a purer home, a purer life, and, as a general result, a sturdy, long-lived, non-degenerate race as a national factor.

[*This Discussion applies to the subject before the Conference on Friday afternoon: "The Training of Scholars in Hygiene."*]

Miss Ravenhill (London) said they were calling upon the children to alter the habits of their parents, which habits had existed for generations. They must therefore go to the homes of the people, and secure on the part of those responsible for the housing, food, and so forth of our industrial classes, conditions which would permit of the practice of hygiene which had been taught in the schools. For this reason they must steadily work to arouse the interest of those who are responsible for the secondary education, in the importance of these subjects. In none or only few of the great English public schools was this instruction at all systematic. With the general training of teachers in a com-

prehensive knowledge of hygiene there would be no need to bring in another subject into the curriculum, but by wise correlation the amount of information necessary could be judiciously and impressively imparted. She did not consider that the inclusion of physiology in the school curriculum is desirable. It is not much physiology that is needed, but a great deal of observation of the influence upon life of nutrition and environment, with just as much physiology as is necessary to explain the functions of the organs chiefly concerned. They wanted to make the members of the community alive to their responsibilities not only to themselves but also to their neighbours; and unless they began to develop this spirit during the plastic period of childhood, they would continue to be confronted with many disappointments associated with a lack of interest in what one might call municipal housekeeping which is shewn in this country.

DR. J. GROVES (Isle of Wight) said he had been surprised to hear suggestions of limitations of the functions of medical officers of health, made even by members of the medical profession. Medical officers had not only to do with drains, water-supply, and clean air, but they had to deal with everything directly or indirectly affecting the interests of public health. As a delegate of the British Medical Association, he was there to say that the members of his profession in the colonies were as interested in these questions as the members of the profession in this country. He agreed with Miss Ravenhill that it is more to an atmosphere and habit of hygienic conduct that we have to trust than to direct teaching: later, perhaps, the reasons might be taught.

DR. CLAUDE TAYLOR (Hampstead) said he regretted that at this period it should be feared to introduce hygiene as a new subject, and it was suggested there was no room for it in the curriculum. But it might claim a prior place to some of the subjects already in the syllabus. He suggested that only a few minutes once a week given to the subject would have an important bearing on the hygienic life of the children, and he laid special stress upon the importance of dealing with the subject of temperance.

DR. P. BOOBBYER (Nottingham) said that medical officers of health were particularly interested in the methods and character of school-instruction. Working daily among the poor, they were convinced of the necessity of a more rational teaching than is at present imparted. He was strongly of opinion that the person to whom the child must look for instruction in hygiene is the teacher, for a child would naturally attach the most importance to what the teacher said. The child must be taught, and from the teacher the child must learn.

DR. H. B. BRACKENBURY (Hornsey) explained that Hornsey was one of the few educational districts where there was compulsory teaching of hygiene to the elementary school-children. They had found that the difficulties in the way were largely imaginary, and that if the matter were approached in an earnest

and systematic manner there was really little difficulty in adding this subject to the curriculum.

Dr. Lutoslawski (Warsaw) said he felt that we were only at the beginning of the subject in many respects, and he suggested the great benefit of The Royal Sanitary Institute starting an investigation in the most important question of private hygiene. The scientific world needed to be organized if health problems were to be adequately solved. He mentioned the fact that the Polish Ministry of Education (the first Ministry of Education in the world) had faced the difficulty 120 years ago, and introduced in all elementary and secondary schools in Poland compulsory tuition in hygiene. To make up for the deficiency of books dealing with the subject, the Ministry had arranged for an international competition for the best book on elementary hygiene, and in a few years they had got very good books on the subject. He threw out that suggestion for the benefit of the Institute.

Dr. H. Jones (Hereford) explained what has been done in a small way in Hereford, where a card printed in large type in understandable language, setting out what things should be done, and what things should not be done, was hung up in every school. The good results were marked. He rarely found a closed window or a stuffy school. As the result of various efforts the sanitary condition of those schools had been immensely improved. He went to the farmhouses and cottages, and explained to the occupiers what should be done, in the same way as he had attacked the schools, so that there was now a sanitary education of the people at home as well as of the children in school.

Mr. C. W. Cook (National Union of Teachers), on behalf of the teachers, pointed out that hygiene would necessarily only be one of many subjects, and urged the preservation of a sense of proportion of what was desirable to be taught in the schools. He regarded the medical scheme of teaching hygiene, which began before the child was seven years of age, as rather formidable. In any scheme it was essential that they should avoid overloading.

Mr. G. Jackson (Essex C.C.) referred to the difficulty of parents in doing what was desirable for the children owing to bad home-conditions. Many of them lived in one or two rooms, and it was not always possible to put in practice what was taught in school. They must study how to do the best under existing conditions, many of which were unavoidable through the nature of work or poverty.

Mr. H. A. Nesbitt (King Alfred School) explained what was done in the Hampstead School in the teaching of hygiene. The children had the care of the hygiene of the school in their own hands, attending to ventilation, temperature, and so on. In this way the children were taught practically elementary principles of hygiene and right conduct. They were able to find time for this subject, although they had short hours.

DECISIONS OF COUNCIL ON RESOLUTIONS PASSED AT SCHOOL HYGIENE CONFERENCE.

"That the periods for school lessons should be short (20 to 50 minutes) and that there should be increasing intervals of not less than five minutes between successive lessons for recreation, taken if possible in the open air."

The Council decided to send this resolution to the Board of Education, nd to suggest that the length of school-lessons should be graduated ccording to the age of scholars.

"That suitable breathing exercises should be practised at least once during each school session, in the open air or in well-ventilated rooms."

The Council decided to send this resolution to the Board of Education vith the approval of the Council.

"That organised drill should be regularly practised by the pupils in every school."

"That the acquisition of swimming should be encouraged in every school, and should be taught to the pupils wherever this is practicable."

"That an efficient system of fire drill should be compulsory in every school (and in each 'house' of boarding schools conducted on the house system), and should be practised at least three times in the course of each school term."

The Council decided to send these resolutions to the Board of Education with the approval of the Council.

"That having regard to the greater risk of susceptibility to infectious diseases amongst young children, no child should be permitted to begin formal instruction in school classes under the age of 6 years."

The Council decided to send this resolution to the Board of Education, nd to suggest that the age referred to in the resolution should be five ears.

The following resolutions were also passed and are still under consideration by the Council:—

"That for younger scholars, at all events, there should be no lessons after school hours."

"That in the opinion of the meeting of the Conference on School Hygiene ample hours of sleep according to age are essential to the well-being of growing children."

"That H.M. Inspectors of schools should be qualified in hygiene and sanitation, and familiar with the development of child life. This meeting, therefore, urges the Council of The Royal Sanitary Institute to memorialise the Board of Education to protect health in school life by appointing at least some men and women Inspectors who are specialists in school hygiene."

"That the Council of The Royal Sanitary Institute be asked to direct the attention of the Board of Education to the results of an inquiry made in both urban and rural schools, among inspectors and teachers, which indicates the great importance of appointing suitable and properly qualified *women* Inspectors for infants' and girls' schools of all grades, for pupil teachers' centres, and for training colleges; also that the inspection of domestic subjects should be entrusted to women."

"That it is the opinion of this meeting that there should be regular and systematic medical inspection of children in schools of all grades, and it requests that the Council of The Royal Sanitary Institute will bring this important matter before the educational authorities of the country."

"That the question of the control of schools, private or otherwise, from a sanitary point of view, be referred to the Council of The Royal Sanitary Institute for consideration, with the view of such representation being made in the proper quarter as the Council may think fit."

"That in view of the great responsibility thrown upon teachers of all grades, in respect of the hygienic management of schools, and the growing demand that they should be qualified to introduce some elementary instruction in the general principles of hygiene into the curriculum of their schools, this meeting earnestly requests the Council of The Royal Sanitary Institute to lay the following points for consideration before the President of the Board of Education:—

The fragmentary and incomplete character of the five syllabuses in school hygiene, set out in Appendix C. of the Board of Education regulations for the training of teachers, 1904.

The great importance of emphasising officially the need for some general provision for the instruction in hygiene of those teachers in both secondary and elementary schools who desire to obtain such instruction, whose period of training is past, or who have never entered a training college, or taken a diploma in education.

The opinion expressed by a special committee of the British Association in two successive years that the Board of Education should be memorialised to adopt or to recognise a thorough and practical test of a teacher's knowledge and experience of the applications of health principles in school life."

A LIST OF THE AWARDS made in connection with the Exhibition f School Building and Furnishing Appliances, is given at page 27 of upplement.

GENERAL NOTES.

SCHOOL HYGIENE IN SOUTH AFRICA.

A LECTURE was given in Cape Town on this subject recently by Dr. Jasper Anderson, Medical Officer of Health for Cape Town, and Honorary Secretary of the Board of Examiners of the Institute for British South Africa.

Dr. Anderson drew attention to the necessity for training the body as well as the mind, and referred to the work of the recently-formed association for the prevention of consumption in South Africa. It was the work of this association to instill into the minds of the people the necessity for perfect cleanliness in everything, and in their endeavours they were hampered by ignorance, prejudice, ridicule, and carelessness. The quickest method to obtain the desired end, in face of these obstacles, would be to get hold of the child when at school—the impressionable age.

To carry out this method, properly qualified teachers in the schools were necessary. There were difficulties in the way of providing special teachers for hygiene alone, both on account of the expense and the difficulty of administering such a system of education in a sparsely populated colony. Moreover, the advantages of educating all teachers on this subject far outweigh any considerations in favour of special teachers. The school teacher is always with his or her pupils in the school, and has a greater influence over them than one who visits it at intervals.

To see the laws of health daily put into practice in schools has unconsciously a great effect upon the scholars, and helps to form their characters, and in many instances the assertive qualities of the child carries this influence home.

Referring to the training required by school teachers in hygiene in its bearing on school life, the lecturer made reference to the examinations in this subject held by the Institute, and the preparatory course of training.

Dr. Anderson pointed out the importance of teachers being able to recognise the symptoms of infectious diseases, the spread of these diseases in schools being largely due to unrecognised cases of disease still attending the school. He laid stress upon the necessity of providing proper cloak-rooms and means of drying wet clothes, and the need for intervals between lessons, spent by the scholars in the open air, while the windows of the schoolroom should be thrown wide open. The question of school desks and books was also very important. There should be a single seat for each scholar, and the height should be such that when sitting upright on it, and with his back against the support and knees bent at a right angle, the heels should touch the floor. The edge of the desk should project slightly over the front edge of the seat, so that in writing the scholar has no necessity to lean forward and place his spine and other parts in unnatural attitudes.

Lessons on the elements of hygiene could be illustrated by object lessons, without the use of scientific terms. To these there should be added, along with other practical work, instruction in the purchase of foods, the preparation of meals, and the care of infants.

NOTES ON LEGISLATION AND LAW CASES.

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LIGHT AND AIR.—*Ancient Lights—Prescription—Light necessary for Special Purpose or Business—Ordinary User—Question of Fact.*

A right to a special amount of light necessary for a particular business cannot be acquired by 20 years' enjoyment to the knowledge of the owner of the servient tenement.

In considering the question of the right to relief for interference with ancient lights, it is a question of fact whether the user of the premises is one which requires an ordinary or a special amount of light. It cannot be predicted as a matter of law whether any particular business, *e.g.*, an architect's, is an ordinary business in the sense that it only requires an ordinary amount of light.

COLLS *v.* HOME AND COLONIAL STORES (1904), A. C. 179, discussed.

AMBLER AND FAWCETT *v.* GORDON. Bray, J. 417.

SEWERS.—*Drain or Sewer—Pipe draining several Houses belonging to different Owners—Single Private Drain—Nuisance existing on Land of one Owner—Notice to abate Nuisance—Notice to other Owners—Apportionment of Expenses Local Government—Public Health Act, 1875 (38 & 39 Vict. c. 55), ss. 4, 41 Public Health Acts Amendment Act, 1890 (53 & 54 Vict. c. 59), s. 19.*

A drain-pipe passing through private property, and receiving and conveying to a public sewer the drainage of several houses belonging to different owners, is a "single private drain" within the meaning of s. 19 of the Public Health Act, 1890. A notice to the owner of one of the houses on whose land a nuisance, arising from the defective state of such a drain-pipe, is found to exist, to abate the same and to execute certain works for that purpose, is a sufficient notice to throw upon him the duty of abating the nuisance, and, upon his default, to entitle the local authority to recover from him the expenses incurred by them in so doing. In such a case no notice need be given to the other owners, and

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LIGHT AND AIR.—*Ancient Lights—Prescription—Light necessary for Special Purpose or Business—Ordinary User—Question of Fact.*

A right to a special amount of light necessary for a particular business cannot be acquired by 20 years' enjoyment to the knowledge of the owner of the servient tenement.

In considering the question of the right to relief for interference with ancient lights, it is a question of fact whether the user of the premises is one which requires an ordinary or a special amount of light. It cannot be predicted as a matter of law whether any particular business, *e.g.*, an architect's, is an ordinary business in the sense that it only requires an ordinary amount of light.

COLLS *v.* HOME AND COLONIAL STORES (1904), A. C. 179, discussed.

AMBLER AND FAWCETT *v.* GORDON. Bray, J. 417.

SEWERS.—*Drain or Sewer—Pipe draining several Houses belonging to different Owners—Single Private Drain—Nuisance existing on Land of one Owner—Notice to abate Nuisance—Notice to other Owners—Apportionment of Expenses Local Government—Public Health Act, 1875 (38 & 39 Vict. c. 55), ss. 4, 41 Public Health Acts Amendment Act, 1890 (53 & 54 Vict. c. 59), s. 19.*

A drain-pipe passing through private property, and receiving and conveying to a public sewer the drainage of several houses belonging to different owners, is a "single private drain" within the meaning of s. 19 of the Public Health Act, 1890. A notice to the owner of one of the houses on whose land a nuisance, arising from the defective state of such a drain-pipe, is found to exist, to abate the same and to execute certain works for that purpose, is a sufficient notice to throw upon him the duty of abating the nuisance, and, upon his default, to entitle the local authority to recover from him the expenses incurred by them in so doing. In such a case no notice need be given to the other owners, and

the provisions of s. 19 of the Act as to apportionment of the expenses incurred by the local authority in executing the necessary works are not applicable.

BRADFORD *v.* EASTBOURNE CORPORATION (1896), 2 Q. B. 205, approved.

THOMPSON *v.* ECCLES CORPORATION (1904), 2 K, B. 1, and HAEDICKE *v.* FRIERN BARNET URBAN DISTRICT COUNCIL (1904), 2 K. B. 807, overruled.

THOMPSON *v.* ECCLES CORPORATION. HAEDICKE *v.* FRIERN BARNET URBAN COUNCIL. C. A. 110.

WATER SUPPLY TO ADJOINING DISTRICT—*Sanction of Local Government Board—Particular Area—Penalty Clause—Public Health Act, 1875 (38 & 39 Vict. c. 55) ss. 61, 174.*

Sect. 61 of the Public Health Act, 1875, merely empowers the Local Government Board to sanction the supply of water by the local authority of one district to the local authority of an adjoining district, and does not require them to consider the terms of the agreement between the local authorities.

An agreement for the sale of water by an urban authority to a rural authority does not require a penalty clause under s. 174, sub-s. 2, as that sub-section is confined to cases where work, materials, matters or things to be furnished, had or done to or for an urban authority for a price to be paid by that authority.

SOOTHILL UPPER URBAN DISTRICT COUNCIL *v.* WAKEFIELD RURAL DISTRICT COUNCIL. Swinfen Eady, J. 53.

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REMARKS ON THE QUESTION OF THE AERIAL DISSEMINATION OF SMALLPOX INFECTION ROUND SMALLPOX HOSPITALS.

By HENRY E. ARMSTRONG, D.Hy.,
Medical Officer of Health, Newcastle-upon-Tyne.
(FELLOW.)

Read at Sessional Meeting, Newcastle-upon-Tyne, March 4th, 1905.

THE issue in November last by Dr. G. S. Buchanan of his Report to the Local Government Board on smallpox in Gateshead and Felling in relation to Sheriff Hill Smallpox Hospital, has very naturally been a matter of great interest, not only to the sanitary districts immediately concerned, but to the nation at large. For if the conclusion of Dr. Buchanan "that the use of this hospital has been responsible directly or indirectly for a material portion of the epidemic" in Gateshead and Felling be justified, and his recommendation "that Sheriff Hill Hospital shall no longer be used for the isolation of smallpox" be accepted and acted on, then every smallpox hospital placed under similar circumstances is a danger to its surrounding population, which ought not to be permitted to exist.

It is not the intention of the writer to criticise the details of a report on matters occurring outside of his own district, which he has not personally investigated. But having had some experience as to the effect of smallpox hospitals on populations living at different distances from

them, he ventures to offer the results of this, together with certain observations on the general question at issue.

At the time of the great smallpox epidemic of 1870–72, the principal hospital in Newcastle for the reception of cases of that disease was the old Fever Hospital in Bath Lane, supplemented by a wooden block in the same curtilage, which together contained fifty-six beds. These beds, during the chief part of the epidemic, were filled with acute cases, the convalescents being drafted to a Home at South Byker. One of the hospital blocks was only fifty feet from the densely populated dwellings of Stowell Street, and the hospital mortuary was only thirty-four feet from the same houses. The writer was medical officer of the hospital throughout the epidemic. He does not remember a single complaint against the hospital by the residents of the street during that period, except as regarded the smell of carbolic acid; and speaking without the hospital admission books before him, he believes that there was very little, if indeed any, smallpox among the inhabitants of the street throughout that period.

The sectional diagram (p. 197) shows the relative positions of the houses of Stowell Street and the old hospital. The two sets of buildings are separated by the old town wall, nine feet high on the hospital side, and rising to a considerable height above the eaves of the houses of the street. It may be that to this circumstance the street largely owed its immunity from infection during the epidemic.

The facts were brought by the writer to the notice of Dr. R. Thorne Thorne, then a medical inspector of the Local Government Board, on his inquiry in 1882 into the "Use and Influence of Hospitals for Infectious Disease." An experience such as the foregoing could not well be without effect on the mind of an observer, and the lesson the writer then learnt made a deep impression. That impression still remains, but it has been somewhat modified by recent events in relation to a sharply defined group of twelve cases of smallpox at St. Peter's, in the eastern end of Newcastle, notified between the 27th June and the 16th July in last year. Ten of these cases occurred in one street of tenement dwellings (High Chapel Street); the remaining two cases were in closely adjoining streets. As careful inquiry failed to trace the origin of any of these twelve cases, attention was drawn to the possibility of infection having been conveyed through the air from Gateshead or Felling. The dates of first feeling of illness were in each of the cases compared with the directions of the wind on the 14th, 13th, 12th, 11th, and 10th days before

(*i.e.*, the dates of probable catching of infection). The following are the results.—

Cases of Smallpox at St. Peter's notified from June 27th to July 16th, 1904.

Address.		Date of first feeling illness.	Direction of Wind 10th to 14th day before first feeling of illness.				
		1904.	10th.	11th.	12th.	13th.	14th.
6 Hotspur Street	...	June 24th.	S.S.E.	E.S.E.	...	N.	N.N.E.
35 High Chapel St.	(1)	June 22nd.	...	N.	N.N.E.	N.	N. by W.
" "	(2)	June 24th.	S.S.E.	E.S.E.	...	N.	N.N.E.
" "	(3)	June 19th.	N.E.	N.N.E.	N.E.	N.E.	S.E.
33 " "	(1)	July 5th.	N.	S.	W.	N.W.	N.W.
" "	(2)	"	N.	S.	W.	N.W.	N.W.
" "	(3)	July 7th.	N.W.	N.	N.	S.	W.
35 " "	...	"	N.W.	N.	N.	S.	W.
58 " "	...	July 8th.	S.E.	N.W.	N.	N.	S.
62 " "	...	July 7th.	N.W.	N.	N.	S.	W.
41 Fell Street ...	...	"	N.W.	N.	N.	S.	W
33 Chapel Street	...	July 11th.	S.W. by S.	S.E. by E.	N.N.E.	N.N.W.	N.W.

Of the 12 cases of smallpox in question, the possible infection-period occurred on days when the wind was blowing—

From the south-east, in five cases (viz., on one day in each of three cases, and on two days in each of 2 cases);

From the south-west, in one case on one day;

From the south, in six cases (for 1 day in each case, one of these cases having also a date of possible infection on another day with a south-east wind).

In one instance only was the disease likely to have been contracted when the wind was in a northerly direction on days of possible infection. The significance of the foregoing particulars will be understood when it is explained that a south-east wind blows directly from the Felling Smallpox Hospital, and a south-by-west wind directly from the Sheriff Hill Hospital across the river to St. Peter's, Newcastle, where the above cases of smallpox occurred. The former hospital is a little under a mile, and the latter a little under two miles distant from the site of the outbreak of smallpox. It is not to be assumed that infection was absolutely blown across the river through the air to Newcastle, but it *may have been* so conveyed.

There is one possible explanation of the convection of the variolous poison to a great distance which has hitherto, I believe, received little or

no attention, and which may help to reconcile conflicting theories. *House-flies* are a pest in smallpox wards, settling on the faces and other exposed parts of the patient when the eruption is pustular or crusting. With feet and probosces laden with the poison, they presently reach the open air, and may be carried by the wind to any distance, to infect persons, food, clothing, etc. For many years the writer has used muslin netting over the upper half of the bed to prevent the access of flies to the patient in the wards. The ventilating outlets might probably with advantage be guarded in like manner.

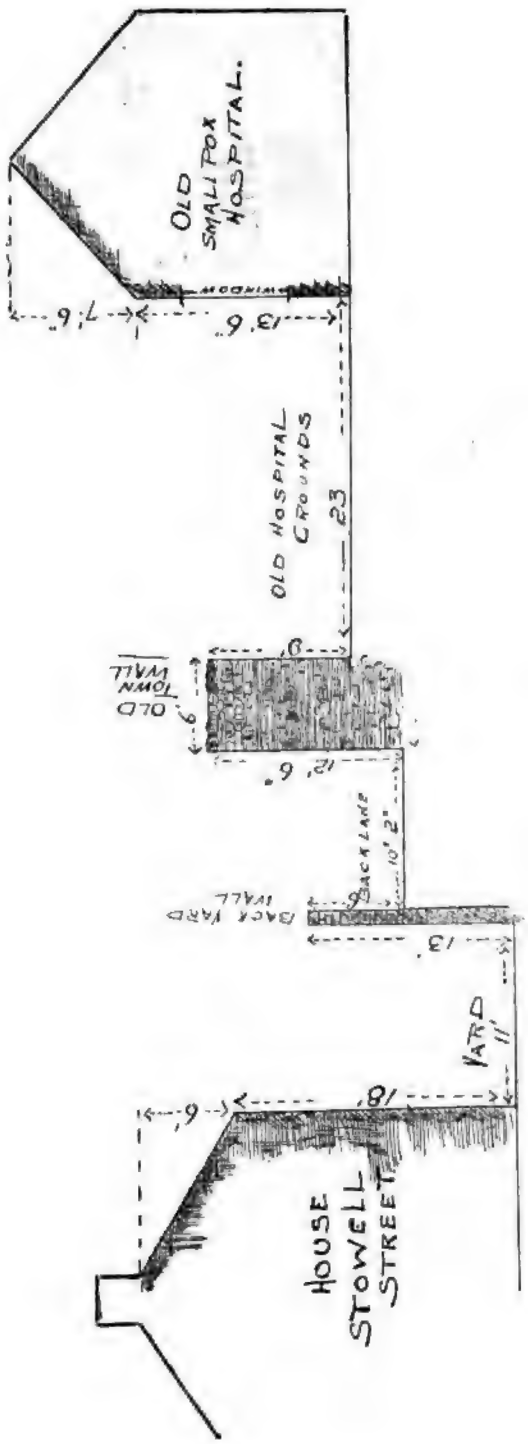
If the cases here described, or any one of them, resulted from infection carried by the air from one or both of the Smallpox Hospitals on the other side of the River Tyne, at what distance from such a hospital can safety be counted on?

In one of his reports on the spread of infection round Fulham Smallpox Hospital, the present Medical Officer of the Local Government Board, Mr. W. H. Power, records his conclusion "That the excess of smallpox in the neighbourhood of the hospital was quite and specially remarkable at a time when the total admissions to hospital had not exceeded nine."* He subsequently stated his opinion† that on one occasion there occurred a notable increase of the disease among the surrounding population when the number of acute cases in the hospital was only five.

What are the practical lessons to be learnt from the foregoing? If the view be acted on that a hospital containing only five acute cases is a danger to everyone living within half a mile or a mile of it, and should be closed as such, then very few hospitals for smallpox can be left open. If those within a mile of dwellings are closed, suitable sites elsewhere will be difficult to meet with. In the event of smallpox breaking out in a district unable to provide itself with a hospital at the desired distance from dwellings, many of those dwellings would soon become more dangerous than the hospital before its closure. This raises the question, *is* the occurrence of a limited number of cases of smallpox round a hospital necessarily a reason for its closure? In the past, hospitals have got the blame of spreading air-borne disease round about them, which has afterwards been traced to negligence on the part of hospital officials. Here the remedy is not the emptying of the wards. If infection is carried otherwise than by flies, etc., can the risk of its spread through the atmosphere be prevented? It may at least be reduced by passing the

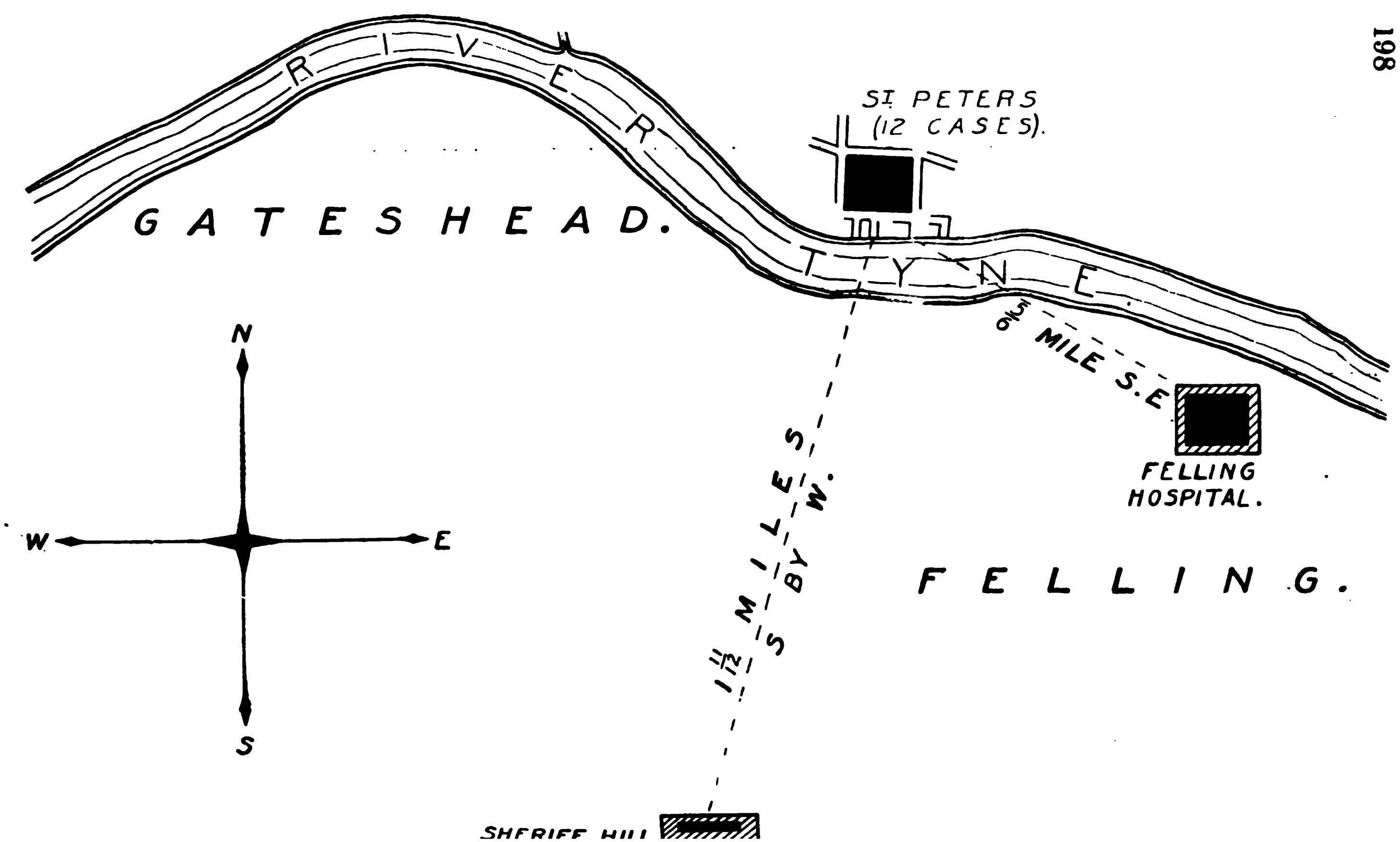
* Fourteenth Annual Report of the L. G. B., 1884-5. Report of the Medical Officer for 1884, p. 26.

† Fifteenth Annual Report of the L.G.B. Report of the Medical Officer for 1885, p. 11.



OLD SMALLPOX HOSPITAL, NEWCASTLE-UPON-TYNE.

PLAN SHOWING POSITION OF HOSPITAL.



outgoing air of the wards through fire. Apparatus for this purpose is in the market.

The Sanitary Committee of the Newcastle Corporation are fully awake to the desirability of having a hospital for smallpox in some other position than the present one on the Town Moor. But after a prolonged search no suitable and available site has, up to the present, been found.

In conclusion, whilst there can be no dispute as to the advantage of having a smallpox hospital as far removed from ordinary houses as is compatible with convenience of working and other practical needs, the hard and fast requirement of a half-mile radius of uninhabited space round it would, in many a district, be an absolute bar to its erection.

By T. MORRISON CLAYTON, M.B., B.Hy., D.P.H.,
Medical Officer of Health, Gateshead.
(MEMBER.)

FROM April 18th, 1903, to June 5th, 1904, we had in Gateshead 513 cases of smallpox, and these are the cases which are dealt with in Dr. Buchanan's report.

Of these cases, fifty-six occurred in our district within half a mile of our hospital. In Windy Nook, which is part of Felling Urban District Council, Dr. Buchanan's spot map shows twenty-four centres within half a mile of Sheriff Hill Hospital. I cannot say how many cases these represent.

The report shows that the prevailing winds are S.S.W. to W.N.W. Of these, W.N.W. winds are usually and S.W. winds often strong. The most prevalent light winds are S.W. and S. Gentle winds from S. and S.W. would blow from the hospital over the neighbourhoods of Blue Quarries and Windy Nook, which lie to the east of the Old Durham Road. Gentle winds from the S.E. and E. would blow over part of Low Fell, west of the Old Durham Road.

As regards the number of houses attacked, the report shows six per cent. in the direction of Blue Quarries and Windy Nook, fourteen per cent. along the Old Durham Road, and about two per cent. in the Low Fell direction.

Dr. Buchanan states: "When the half-mile area is split up in this way, the figures become too small for any certain inferences to be drawn

as regards effect of winds. So far as they go they are not inconsistent with an inference that aerial convection has operated to a greater extent to the north and north-east of the hospital than to the west of it. In other words, they accord with the suggestion in Dr. Eustace Hill's report that the carriage of infection from the hospital into Felling may be associated with the direction of the most prevalent winds. If this was in fact the case, the circumstance would assist to explain the heavy incidence of smallpox on Coldwell Lane and High Felling, from half to one mile N.E. from Sheriff Hill Hospital."

Speaking of Felling Hospital he states: "There are 227 dwellings within a quarter of a mile, as against 330 within a quarter of a mile of Sheriff Hill Hospital. Ten of these 227 dwellings were invaded with smallpox. The hospital stands in the North Ward, near the Tyne. A large proportion of the dwellings within half a mile of Felling Hospital (and especially those within a quarter of a mile) lie in deep, narrow gullies which traverse the low plateau on which the hospital stands. These gullies are partly natural and partly made. The air in these gullies is almost always stagnant, and the houses in them are well screened from any light winds blowing from the direction of the hospital. Light winds from S. and S.W. which appear to have favoured aerial convection round Sheriff Hill Hospital, would carry infected air rising from the wards of Felling Hospital across the Tyne."

He concludes "by having no hesitation in recommending that Sheriff Hill Hospital should no longer be used for the isolation of smallpox." This is his conclusion after stating on the same page of the report that the figures are too small to draw any certain inferences.

There are four periods shown:—

	Gateshead.	Felling.
1. April 12th, 1903—August 31st, 1903 ...	68 ...	6
2. September 1st, 1903—November 30th, 1903 ...	41 ...	14
3. December 1st, 1903—February 29th, 1904 ...	205 ...	53
4. March 1st, 1904—June 5th, 1904	199 ...	85
	513	158

It will be noted that "the infected air" from Sheriff Hill Hospital, standing at an elevation of 520 feet, blows down to Felling, Gateshead, and Low Fell, whereas "the infected air" of the Felling Hospital, lying near the Tyne, blows over the tops of the houses lying in gullies where the air is stagnant.

On this arguing, it seems to me that the best place to build a smallpox

hospital is where the air is stagnant, which would be best found in gullies and where there are several buildings; and conversely it would be most dangerous to build one where there are few houses unprotected by screening, natural or artificial. I ask if we, as the health advisers of local authorities, have done our duty in allowing them to build houses where the air is stagnant, and consequently unfitted for efficient ventilation? But ventilation must and does take place. In the day time the air in gullies and valleys becomes heated and expanded, and the air, therefore, has a tendency to rise and mix with that above it so long as this heat action is maintained. At night the temperature in these places falls, and the air lying in them contracts, producing a partial vacuum. This causes the air to descend, so that a downward current is generated which lasts all through the night. The idea to me, therefore, that gullies would protect houses situate therein from pollution with smallpox-infected air blowing over them sinks into insignificance. Is it not true, also, and that on the explanation of heat, that during the day we have upward currents produced, and during the night downward currents? With gentle winds, then, blowing down the hill during the night, infection would be carried to Felling, but would not winds blowing up the hill also carry infection from the Felling low-lying hospital? I contend that what is true of one in this respect must be true of the other. Suppose that we disregard entirely these nocturnal and diurnal influences, and assume that currents over this small area blow horizontally (for be it understood that hitherto we have only instruments to record direction and velocity of horizontal currents), we neglect another very vital factor, and that is elevation. Take, again, Sheriff Hill Hospital, at its elevation and from it, winds blowing horizontally, and couple with it the striking distance of smallpox infection as half a mile on the level, and suppose that the energy of the contagium prevents it being carried further; are we to assume that it now drops perpendicularly, or by undercurrents is carried to repose at an angle? It would follow that the striking distance would be more probably three quarters to one mile, and the parts nearest the hospital would be the safest. Or, on the other hand, if the contagium must be carried in horizontal planes, and strike in the same horizontal plane, Sheriff Hill Hospital would be more likely to infect Walker or Newcastle, each across the Tyne.

I do not need, however, to theorise to find the explanation of the incidence in our own borough within half a mile of the hospital. When Dr. Buchanan was here, out of the fifty-six cases there were some eight or nine I could not trace, but by subsequent investigation I have traced

the origin by contact of fifty-two cases. Of the four remaining two are in one house and gave rise to no other ascertained case. A third I cannot as yet trace. The fourth gave rise to one other ascertained case. If, then, four unascertained cases out of fifty-six are enough to establish aerial convection, I fear its foundation is of weak resistance. The fact, of course, that these four cases only gave rise to one more, does not disprove an unusual source such as aerial convection; for any one case might have given rise to several cases, and what was the cause of the original one would necessarily have been the cause of all that followed, and this would be strong evidence in favour of the contention of an unusual source. So far as Sheriff Hill is concerned, however, it does disprove that any unusual cause has operated conspicuously. I am now of opinion that with few exceptions (such as mild cases of varioloid riding in tramcars, railway carriages, and so on) all cases could be traced to contact if we could only get the truth of the movements and associations of the sufferers.

As regards those in Windy Nook, within half a mile of our hospital, the medical officer of health for Felling states that several cannot be traced. I venture to offer a source of several, and this will be found due to a tramp who was admitted to our hospital on October 13th, 1903, suffering from smallpox in the pustular stage. From this source in Gateshead we subsequently traced 81 cases, with 6 deaths. You will notice that of the 24 spots on the map 15 occurred in the period when we had so many cases following this man's perambulations. The tramp told me he had come from Catcleugh *viâ* Otterburn, Woodburn, Ridsdale, Tonepit, Hexham, Consett, Stanley, Birtley, Blackfell, and Wrekenton, to Gateshead. A fortnight after his admission the medical officer of health of Felling wrote asking me if I had this man in hospital, and if it were true he had slept at Oakley's Farm, Windy Nook, where another case now occurred. Both questions were answered in the affirmative. On the 29th November, 1903, I was notified of a case (the first during the epidemic) at Mount Pleasant, and in tracing this woman's contacts I discovered a family of eight, all of whom were suffering from the disease. One boy had been ill of smallpox for some time; he had shaved the tramp at a hairdresser's shop in Windy Nook the day before he came to hospital. The boy developed a rash a fortnight after shaving the tramp. Not only had this tramp been shaven, but he had, through the kindness of the hairdresser, been supplied in the house with several meals two or three days before. As the shop is one room of the house the whole place must have been reeking with infection; furthermore, a roller towel is used

by several customers. The hairdresser tells me the house was not disinfected till after my discovery of the boy. It would be impossible to find out how many people had been infected from this shop. It is no discredit for the officials of a district under such circumstances to be unable to trace all contacts, but on the other hand, with such a doubt hanging over us, I contend it does not elevate our individual status nor that of our profession, to fall upon the wind as the probable cause of the spread and the shield of our shortcomings.

If a hospital which is generally well ventilated acts so seriously as a centre of infection by aerial convection, should not an ill-ventilated house of two, three, four, or even more rooms act equally as much in, of course, a size proportional manner. In some districts, when a patient suffering from smallpox is removed from a house, the contacts are quarantined in the house over the incubative period, that is to say, fourteen to seventeen days. These persons are breathing and re-breathing vitiated air which must necessarily be more foul than that of a hospital. I do not assume that in every house a second case occurs, but I am safe in saying that, owing to contacts refusing vaccination, and probably in some instances the primary case not being discovered till several days of the illness is passed, at least 12 per cent of such cases occur. Although there are not as many sufferers as in a hospital, yet in proportion to the difference of the allowance of cubic space in a dwelling-house and a hospital, I am under the impression that the air of such a house would be more dangerous than that from a properly kept and ventilated hospital with many cases. This being so, if aerial convection had the dangerous significance assigned to it, the spread of the infection would be entirely beyond reasonable control.

As regards hospital influence within a quarter of a mile, I can point out at least three circles of a radius of a quarter of a mile each, right away from the hospital giving nearly double the cases we have in the hospital quarter-mile circle. It may be stated against this that there are more houses, but then on Dr. Buchanan's reasoning as regards stagnant air, etc., we should expect fewer cases.

I question very much whether in a smallpox epidemic the percentage of dwellings attacked is a sound guide. With all our ideas of the failings of the people with regard to vaccination—that is to say protection, we must not forget that in every community there are people whose whole household is protected against a visit of smallpox, and I contend, until we know how many houses have susceptible inmates, we cannot arrive at any true index. It is very different with an outbreak of typhoid fever. If we suspect a polluted water supply, it is only by enumerating the

houses actually supplied by that water in any district that we can arrive at a correct idea of its magnitude.

In conclusion I have no hesitation in saying that aerial convection of smallpox (except in the immediate vicinity of the patient) exists in theory only; a theory which has been built on insufficient evidence, and one which is weakened more and more by the daily practical experience in dealing with the disease.

Dr. Buchanan (Local Government Board) said that all would be grateful to Dr. Armstrong for his admirable introduction to the discussion of a very intricate subject. He need only deal briefly with the observations made by Dr. Clayton on his report regarding the Sheriff Hill Hospital. The answer to nine-tenths of Dr. Clayton's objections would be found in the report itself. Dr. Clayton had missed the principal point. The main evidence in favour of aerial convection from that hospital was the existence, throughout a thirteen months' epidemic, of a graduated intensity of smallpox incidence on the dwellings in Gateshead and Felling which are in the neighbourhood of the hospital. Out of some 1,300 houses within half a mile, 61, or 4·7 per cent., were invaded by smallpox; in the rest of Gateshead and Felling, more than half a mile from the hospital, the proportion was 1·4 per cent. Subdividing the half-mile area, it was found that 8·2 per cent. of dwellings within a quarter of a mile were attacked, and 3·5 per cent. of those between a quarter and half a mile. In other words, there had occurred in Gateshead and Felling the same characteristic incidence of smallpox in the neighbourhood of the hospital which had been observed in the case of many other hospitals in many other epidemics. No doubt personal infection had operated in the neighbourhood of the hospital as elsewhere, but the hospital influence had still to be accounted for. He did not find it difficult to imagine the way in which aerial convection could take place from hospital wards containing considerable numbers of acute smallpox cases. Patients in the vesicular and early pustular stages are capable of communicating infectious particulate matter to the air to a much greater extent, relatively, than patients in the early and papular stages of the rash, which ordinarily is all that has developed before they are admitted to hospital. There is direct evidence of the extreme infectiousness to susceptible persons of a brief exposure to the air of a smallpox ward, an infectiousness relatively greater than in the case of diphtheria or scarlet fever. Large volumes of such infected air escaping from the hospital would rise on account of temperature differences, and later the infectious particulate matter would, in certain conditions of atmosphere, tend to settle in the neighbourhood of the hospital without great dispersion. If the hospital was in a desert, or if the persons living near it were all vaccinated and re-vaccinated, aerial convection would produce no smallpox. If there were susceptible people

living in the area round the hospital, but all dwelt in one small part of it (say in an institution or workhouse) the risk from the hospital would mainly depend upon the direction of prevalent light winds, and might often be small, though probably it would increase with the proximity of the population to the hospital; whereas if a susceptible population were distributed over the whole area, or a large part of the hospital area, then, if sufficient periods of time were taken, a graduated intensity of smallpox incidence might be expected, the percentage of houses invaded by smallpox in the neighbourhood of the hospital becoming smaller as the distance from the hospital increased. If asked why assumptions of aerial convection are necessary, the answer was that they afford the only satisfactory explanation of the "graduated incidence." This is a definite phenomenon which epidemiologists have to account for, and has been shown to occur under conditions which almost preclude the possibility of the spread of smallpox round the hospital having been due to hospital operations or to hospital maladministration. Its existence was first demonstrated by Mr. W. H. Power in the case of Fulham hospital in 1881, and again in 1884. It was confirmed by Mr. Power's masterly study of the distribution of smallpox, as judged by mortality returns, in different parts of London during the years in which smallpox was treated in one after another of the Metropolitan Asylums Board hospitals in or near populous neighbourhoods. These observations showed how in these years the distribution of smallpox in the Metropolis was again and again determined and dominated by the operations of the hospitals receiving acute smallpox cases. Graduated incidence had since been demonstrated in many other instances: West Ham, 1884–5; Nottingham, 1887–8; Oldham, 1892; Warrington, 1892–3; Bradford, 1893; and, during the recent epidemic years, in Glasgow, 1900–2, and now in Gateshead and Felling. Those who hesitated to accept aerial convection as the cause were bound, in his opinion, to advance an alternative and consistent theory in explanation of the facts. Negative instances had been reported, and no doubt aerial convection did not always happen under all circumstances. But he was struck by the absence of evidence that the problem had been carefully studied in instances comparable to those he had mentioned, with the result that no graduated incidence had been observed. Dr. Armstrong had mentioned the negative experience of Stowell Street and other houses in the neighbourhood of Bath Lane hospital, Newcastle, during the epidemic of 1870–2, and this was valuable. But apparently the Stowell Street area had not always enjoyed this immunity, as it was heavily hit in 1882, just before the Bath Lane hospital was closed and the present hospital on the Town Moor was taken into use for smallpox. In conclusion, he referred to the administrative recommendations of the Local Government Board as to the maximum populations which should be allowed in the neighbourhood of a smallpox hospital. These are intended to provide a useful working standard; no one claimed that they are in any sense definitions of conditions which will ensure absolute security.

DR. T. EUSTACE HILL (Durham C.C.) was very pleased to hear that Dr. Armstrong's views on the aerial dissemination of smallpox were now somewhat modified, for only two years ago that gentleman was a strong opponent of the air-borne theory and had stated that "aerial convectionists were virtually opponents of smallpox hospitals." All medical officers of health were in theory opponents of smallpox hospitals, for they recognised that but for the neglect of vaccination there would be no necessity for separate hospitals for smallpox, as was proved by the experience of well-vaccinated Germany. As matters stood at present, though, the provision and maintenance of separate smallpox hospitals were a necessary evil in this country, and huge sums of money must be annually spent for that purpose. It was, he thought, admitted that the isolation of smallpox patients in hospitals situated in populous districts had resulted in an excessive incidence of the disease on the populations in the vicinity. That was shown to be the case, without doubt, at Fulham, Sheffield, Warrington, Bradford, Glasgow, Gateshead, and many other places, and the negative evidence of spread from the Newcastle and Sunderland old smallpox hospitals had in his opinion very little weight when compared with positive facts as to the influence of smallpox hospitals. Possibly the negative evidence in the case of Newcastle and Sunderland might be explained by the difference in the virulence of the infection, or by the epidemics not having been the subject of such searching inquiry as was the case at Fulham, Sheffield, etc. In his opinion the most common agencies in the spread of smallpox around hospitals were maladministration, traffic to and from the hospital, and the air. Possibly also, flies, as suggested by Dr. Armstrong, might be a factor in the spread of the disease. He admitted that in some instances, such as Sheffield, the spread of smallpox in the neighourhood of smallpox hospitals might be accounted for by contact as a result of defects of administration; but in several epidemics the only satisfactory explanation was that the infection was air-borne. This was especially so in the case of the epidemic at Purfleet, in the Orsett Union, in 1901-2, which was the subject of a most careful and searching inquiry by Dr. Buchanan. Personally he could not conceive that anyone reading Dr. Buchanan's report on the epidemic in the Orsett Union could have any doubt that the air was an important factor in the dissemination of smallpox infection, and he was also convinced that the excessive incidence of smallpox at Windy Nook in the Felling Urban District was the result of infection having been carried by the air from the Gateshead smallpox hospital at Sheriff Hill. He entirely agreed with the deduction drawn by Dr. Armstrong from the conclusions in Dr. Buchanan's Gateshead Report that hospitals so situated as that at Sheriff Hill were a danger to the surrounding population, for within a quarter of a mile of that hospital there was a population of 1,600, and within half a mile a population of 6,250. The requirements of the Local Government Board that there should not be within a quarter of a mile of a smallpox hospital a population of more than 200 and within half a mile a population of 600 were reasonable, and even for a large town there should be no

serious difficulty in obtaining a site which fulfilled those requirements. The surroundings of the Nottingham smallpox hospital to which reference had been made entirely differed from those of the Gateshead hospital, for in the former the population within the quarter- and half-mile radius did not exceed the limit laid down by the Local Government Board, and he quite agreed that the risk of using a hospital so situated for smallpox patients was infinitely small compared with the danger of isolating the patients in their own houses or in a hospital with a large population in its vicinity.

SIR GEORGE HARE PHILIPSON (Newcastle-upon-Tyne), stated that in his position of Professor of Medicine of the University of Durham, in describing to his students the manner in which smallpox was communicated, he had over a period of more than forty years taught that the disease was communicated by aerial convection. His statement was based upon his own personal observation, when, as remote as 1865, he held the office of Visiting Physician to the Bath Lane Fever Hospital, Newcastle-upon-Tyne, and from his consideration of the papers on the subject by eminent sanitarians.

DR. J. C. M'VAIL (Stirling and Dunbarton C.C.) said he had been surprised to learn not long ago how much doubt existed in England regarding aerial convection of smallpox. The decision in the Nottingham case, to which much interest and some importance attached, had to be taken at its true value. In commenting on Dr. Thresh's evidence as to the influence of the hospital ships on the Thames in spreading smallpox in the adjoining part of Essex, Mr. Justice Farwell was reported as follows: "The plaintiff's case depends on the inference to be drawn from an unbroken series of facts. In all cases where A has occurred B has followed, therefore A causes B. But the conclusion depends on the universality of the premiss, and a negative instance unexplained spoils the chain." With all respect, it appeared to Dr. M'Vail that this dictum is not scientifically, though it seemingly is legally, applicable to questions where A and B consist of variables like the smallpox poison and the human body, where there is indeed a third variable, namely, the atmosphere, as a medium for conveyance of infection. Indeed, measuring by such a standard, it would be impossible to prove the existence of infectious disease of any kind. If A be a case of scarlet fever, or typhus, or diphtheria, or measles, or whooping cough, or any other such disease, there is nothing amounting almost to a moral certainty that A will be followed by B; that a second case will result from a first, and we do not know why this should be so; but, if the newspaper report is to be trusted, it would appear that a single case of scarlet fever not followed by another case would, unless in presence of an explanation of the failure to infect, be sufficient in the eye of the law to destroy the proof of the infectiousness of scarlet fever. In the interest of preventive medicine and sanitation, it was fortunate that statute law differs from common law in these matters, and that ordinary public

health procedure is governed by the former and not by the latter, otherwise the prevention of infectious disease in this country would be impracticable. But there were *a priori* reasons for thinking that the carrying power of smallpox might readily be greater than that of other diseases. If half a dozen patients in the acute stage of their malady, one suffering from smallpox, one from typhus, one from scarlet fever, one from measles, one from whooping cough, and one from diphtheria, were placed in a row before even a layman, and if he were asked which of these cases he thought might be most likely to furnish material capable of being carried for a considerable distance through the atmosphere, he would almost certainly point to the smallpox patient. Atmospheric air was universally recognised as a powerful disinfecting agency provided it could get properly at the *materies morbi*, but in the case of smallpox there seemed a *prima facie* likelihood that the disease poison might be protected from the air by lymph or pus, or epithelial debris, much more readily than in any of the other diseases. No doubt, in the areas round a smallpox hospital, other agencies besides aerial diffusion were at work and had to be taken into account, and hospital intercourse would be greater near the hospital than far from it. But it was surely not to be expected that people who had met unrecognised cases of smallpox or other infective media of any kind in streets, tramway cars, railway trains, workshops, or elsewhere, should immediately begin to gather themselves into habitations in quarter- and half-mile zones round the hospital. The practical interest of medical officers of health in the whole question he took to consist in the difficulty of obtaining hospital sites to meet the requirements of the Local Government Board. But that difficulty would not be removed by denying the theory or working hypothesis of aerial convection. It mattered nothing to a man getting smallpox through hospital influence, whether the influence were aerial or by contact. What the man objected to was his catching the disease. Where a smallpox hospital in the course of an epidemic did not spread the disease around, either aerially or by intercourse, it was only human nature in those responsible for its management to attribute the result to excellence of administration, and on the other hand, where a hospital did spread the disease, it was equally human nature to attribute the result to unavoidable causes, aerial or otherwise. Assuming for the sake of argument that smallpox is not conveyed aerially but only by intercourse, and assuming even further, that perfect administration is capable of absolutely preventing infective intercourse, would that be a sufficient reason for sanctioning the erection of smallpox hospitals in the midst of large populations? Had they any right to assume that in any hospital managed by human beings there would be no failure of administration, not merely in ordinary times, but during all the hurry and bustle of a sudden epidemic of smallpox? Surely not. The hospitals ought to be so situated that there would be very few people within likely reach of any evil influence they might exercise. Where the same hospitals treated smallpox, scarlet fever, diphtheria, and the like, the administration which had been sufficient to prevent

the spread of these other diseases around the hospital, had often been quite insufficient to prevent the spread of smallpox. Had they a right to rely on the management of a smallpox hospital being so much better than that of a scarlet fever hospital where the whole work is so much more regular? No doubt the sanctioning of smallpox hospital sites in populous areas would temporarily relieve the minds of sanitary authorities. They would feel that they had done their duty and would thank God that they had at last got over that difficulty and had brought the Local Government Board to its senses. But the risk was that their mental relief would only be temporary. They would be all right so long as there was no smallpox in the hospital, but when an epidemic came they might find themselves in the same position as many an authority had already done in the past. It would be no kindness on the part of the central authority to sanction sites for smallpox hospitals which would mean large expenditure of public money without removing the risk of the spread of smallpox, which removal it was the whole purpose of the hospitals to accomplish.

THE CHAIRMAN (Dr. Louis C. Parkes, Chelsea) remarked that it was not flattering to the common sense of the English nation that it should be possible to discuss such a subject as smallpox hospitals at all, when the experience of Germany had abundantly demonstrated that a proper system of vaccination and revaccination rendered smallpox hospitals absolutely unnecessary, because there were never any smallpox patients to be treated. He suggested that the Local Government Board should appoint a small commission of experts to inquire into all those cases where it was alleged that smallpox hospitals were in existence and were used for the reception of patients, but no graduated incidence of smallpox in the area of a mile radius around the hospital had been observed. These alleged negative instances required careful investigation at the hands of competent observers, so that all the circumstances attending smallpox concentration might be recorded and compared, both those where aerial convection was suspected, and those where aerial convection was believed to be inoperative.

DR. RENNEY (Sunderland) said that in 1883 and 1884 smallpox was epidemic in Sunderland, and the smallpox hospital then consisted of a temporary wooden two-story building, certified by the Local Government Board as sufficient for sixty-four persons. This building was 20 feet away from the fever hospital, 114 feet from the insane wards, 224 feet from the schools, 56 feet from the lock hospital, and 150 feet from the general body of the "house." The total population at the workhouse was nine hundred. Three hundred smallpox cases were treated, forty-two being the largest number at any one time. Children and adults could come to a distance of 10 to 22 feet of the building. The only vaccination was that of the school children after the hospital had been in use twelve months. The medical officers were most emphatic in stating that at no time during the two years did any spread of smallpox take place to the

workhouse buildings. Before the present sanatorium was built, smallpox cases were treated in large numbers at a hospital in a very poor neighbourhood, closely packed with tenemented houses. Dr. Harris, a former medical officer of health for Sunderland (now of Islington), had stated that smallpox did not spread from this hospital to the surrounding neighbourhood. The cases which did occur near to the hospital were traced to direct infection from other sources. In two other centres in the town the incidence of the disease was far greater than around the hospital. From 1889 to 1904, a period of sixteen years, 131 cases of smallpox had been treated at the sanatorium. During the last two years sixty-six cases had been treated there. He had attended forty of these himself from December, 1903, to January, 1905. The isolation block in which they were placed was 40 feet from the administrative block, 58 from the laundry, 138 from the scarlet pavilion, 75 from a new typhoid pavilion, and 107 feet from another typhoid pavilion. Absolute isolation of everybody brought into contact with the patients had been observed. Nurses and wardmaids slept in the block. Food was carried across, and nothing left the block without previous disinfection. Nurses and wardmaids, when they take a day off duty, have first to go through a disinfecting bath and have their clothes disinfected. There had been no spread of infection to the other pavilions nor to any person in the neighbourhood, although there had been seventeen cases under treatment at one time.

Dr. Waddy (Sheffield), referring to Dr. Clayton's remarks about the infected atmosphere of a small house in a stagnant gully, suggested that perhaps even this might constitute a less menace to the community than that of a well-ventilated hospital. The latter is widely diffused, whereas in the houses of the working classes the vitiated atmosphere would rise to the upper story, and go no further; but it would deposit there its burden of *materies morbi*, which would frequently remain undisturbed until it had become innocuous. Direct infection, Dr. Waddy considered, was by far the most important factor to be reckoned with; yet we must also acknowledge aerial convection as a real agency which could not be disregarded. He agreed with Dr. McVail in observing that there was room for great improvement in the construction as well as the administration of certain statutes. The vaccination acts, in particular, might be made far more effectual by embodying the following reforms, which were by no means novel or original suggestions: (i.) That the administration of public vaccination should be transferred from boards of guardians to the sanitary authorities; (ii.) that every medical practitioner should be virtually constituted a public vaccinator by receiving a fee for successful vaccination, just as for notifying infectious diseases; (iii.) that a definite standard of successful vaccination should be maintained, and enforced by efficient inspection: (iv.) that vaccination and revaccination should be made compulsory.

Dr. S. G. Mostyn (South Shields) said that the opinion of the meeting was that smallpox hospitals were a danger to the people in their neighbourhood,

but as convection by the air is proved by a process of exclusion, all possible causes should be considered. In addition to the three causes suggested, there was the fact that the curiosity of many of the public was (at any rate, on Tyneside) stronger than their dread of the disease. People repeatedly climbed on the walls round the hospitals to see the patients. Perhaps the fact that the wall round the Bath Lane Hospital was twelve feet high on the outside might explain the absence of infection in the neighbourhood.

DR. CHALMERS (Glasgow) remarked on the desirability of having such incidents as had just been related by Dr. Renney published in some detail, in order that the apparent immunity under specified conditions of persons resident in the neighbourhood of smallpox hospitals might be made the subject of definite inquiry. Considerable importance, he thought, attached to the precise conditions present where patients in fever wards escaped invasion when smallpox was being treated in adjacent wards, although he was disposed to think that for the most part the experience was the other way. But, as they all knew, the majority of patients in fever hospitals were children, and it was among the child-population that the protective results of infantile vaccination were, of course, seen at their maximum. Dr. Buchanan had quite reasonably given prominence to the facts which the theory of aerial convection had been advanced to explain, because the tendency at the present time in some quarters undoubtedly was to suggest that if the theory of aerial convection of smallpox could be disproved, the facts themselves, and which this theory was advanced to explain, would in consequence be discredited. On the other hand, he believed that quite apart from any theory to explain the circumstance, it was a not infrequent experience that smallpox hospitals did spread the disease in their neighbourhood. Nor was it necessary, he thought, to show that this spread could only arise from maladministration or from failure to discover the point of contact of individual patients with infection. It was only a relatively small number, after all, of known contacts who ultimately sickened of the disease, because on the whole most cases were recognised in the earlier stages of the eruption, and vaccination was nowadays so vigorously pushed among them that it usually became operative soon enough to protect the contact from developing the disease. Speaking entirely from recollection of the recent prevalence of the disease in Glasgow, he thought he was correct in saying that among many hundreds of known contacts the attack-rate did not exceed three per cent. Indeed, it was not the known, but the unknown, contact from whom danger was to be apprehended. It was well, therefore, that they should see that the facts of hospital influence were not lost sight of, whatever fate should befall the theory of aerial convection as an explanation of them. He need not refer to what was in the knowledge of everyone there, that the aggregation of the more ordinary infectious diseases in hospitals (such as scarlet fever, enteric fever, or diphtheria) had never given rise to any suggestion of injury to surrounding populations. It might, of course, be suggested that the infecting particle in

smallpox had a longer striking distance or was more readily transported. Either or both might be true, yet the case against the hospitals was not minimised thereby. In one way the experience of Glasgow had been unique. Thirty years ago, during the prevalence of smallpox in the early seventies, their smallpox hospital had been situated in the northern part of the city, and there had been a greater incidence of the disease at that time among the population of that part than elsewhere. Before the recent epidemic period, the hospital had been transferred to the eastern district of the city, and the major incidence during the recent outbreaks had followed the hospital. In 1873, out of over 1200 cases in Glasgow, 34 per cent. occurred in the northern portion of the city; and again in the following year, when the number of cases was almost similar, the percentage had been 39. On the other hand, during the prevalence of recent years, almost 62 per cent. of the cases had occurred in the eastern district, although only 23 per cent. of the population lived in this portion. Apart from these figures, which might be said to represent the incidence over the whole epidemic period, evidence of hospital influence was supplied by the movements of the disease during the successive weeks of its prevalence. When the disease appeared in the spring of 1900, it occurred in what might be called the east-central district of the city, and was for some time unrecognised. This illness occurred in the early days of April, and of 72 cases known to have occurred prior to the beginning of June, 33 were from the central and 18 from the eastern district of the city; but in the following weeks a change in the distribution of the disease became manifest. Of 40 cases occurring during the fortnight ending 16th June, 27 were in the eastern district; and in the next fortnight 34 occurred in the east out of 58 for the whole city. Then again, when the disease recurred in the winter of 1901–2, while the early cases were drawn from the northern district, in the fortnight ending 22nd February, 1902, of 147 cases registered, 102 were from the eastern district. During the more recent outbreak of 1903–4, the disease was introduced in the autumn months among the model lodging-house population on the south side of the river, so that of 31 cases occurring during the month of October, 27 occurred in lodging-houses, and only one might be said to be eastern. But during the following weeks a recurrence to the old distribution became established; and when the outbreak ended, the attack-rate was found to be 1·5 per 1000 for the whole city, and 4 per 1000 for the Ward in which the hospital was situated. Facts like these convinced him that even were aerial convection shown to be untenable as a theory, the whole question would require to be discussed over again on the facts of hospital influence.

Dr. W. E. Peacock (Felling) said that he would only refer to two points which had been mentioned in the discussion, the first being connected with Dr. Armstrong's supposed air-borne cases at St. Peter's, the second dealing with his own experience in regard to the incidence of the disease around smallpox

hospitals. At the time Dr. Armstrong's cases developed at St. Peter's, an isolated outbreak occurred at Felling, near the river and just within the quarter-mile radius of Felling Hospital. He was not in possession of wind charts, but from Dr. Armstrong's notes it appeared that at that date the prevailing winds were from the south-east, that was, from Felling Hospital towards St. Peter's. A line drawn on the map from Felling Hospital to St. Peter's would pass directly through that portion of Felling in which those cases occurred. It seemed possible, therefore, that Felling Hospital might have been the cause of the outbreak at St. Peter's, and that the infection had also been carried at the same time into dwellings nearer than those on the north side of the river. In regard to incidence of the disease around smallpox hospitals, in Felling the incidence was greatest in the South Ward, which was near the Sheriff Hill Hospital, and next in the North Ward, in which their own hospital was situated. The attack-rate in the South Ward per 1,000 inhabitants was 12·56 in 1904. In the North Ward, where 182 cases were treated during the year, it was 8 per 1,000. The wards at a distance from these hospitals were comparatively unaffected.

DR. T. M. CLAYTON (Gateshead) said as regards Dr. Buchanan's expression that he failed to touch on the real point, viz., the comparison of incidence round the hospital with other parts of the town, he entirely denied. What did it matter if the incidence round a hospital were three times as great as in other parts of the town; if they could trace the cases to contact, it weakened the positive side of aerial convection. He quite agreed with what Dr. Hill stated as regarded vaccination and re-vaccination, and had always held that no hospitals would be necessary if proper legislation for vaccination took place. He agreed with him also that we could not ignore the opinions of high authorities. We must be largely guided by them, but at the same time our education goes for little if we cannot think independently for ourselves. How many volumes had been written by great authorities on the miasmatic theory of malaria, only to be shown altogether wrong by the work of Professor Ronald Ross and Sir Patrick Manson on the mosquito. Might not even great authorities be mistaken in smallpox; Dr. Waddy did not quite catch his point; he (Dr. Clayton) did not state that air was more foul in gullies. He stated that it was impossible at all times for wind to blow over gullies without mixing with the air therein.

DR. ARMSTRONG, in acknowledging the vote of thanks, expressed his admiration of the excellence of the work done many years ago on the question of the aerial dissemination of smallpox round hospitals, by Mr. W. H. Power, then a medical inspector, now the chief medical officer of the Local Government Board.

THE TRAINING AND DUTIES OF SANITARY INSPECTORS.

By PHILIP BOOBBYER, M.D., (FELLOW).

ADDRESS TO ANNUAL MEETING OF ASSOCIATES.

ON

Tuesday, March 14th, 1905.

TO some of you this may appear a very simple theme. It may seem that a superficial knowledge of the essentials of hygiene, of the provisions of the Public Health Acts, By-laws, Regulations, and Orders, and of the Memorandum on the subject of an inspector's duties issued by the Local Government Board, together, perhaps, with a short course of practical training, are all that is necessary to qualify any average man for the successful performance of the multifarious duties now devolving upon an inspector of nuisances.

I may say at once, however, that anyone who takes this view is not only woefully mistaken, but is likely to be led by his ignorance into errors which a wiser and better informed man would avoid. Fools, here as elsewhere, rush headlong in, where angels fear to tread. An under-estimate of difficulties and an over-estimate of one's capacity for dealing with them are just as dangerous to inspectors of nuisances as to military men, although the consequences to others may not either in character or actual sum be quite so serious in the first as in the last case.

When we reflect that an inspector, not on special duty, must be to some extent at least a jack of all trades and professions, that he must know something, and the more the better, of the work of an architect, engineer, builder, plumber, lawyer, medical man, chemist, veterinary surgeon, butcher, provision dealer, and many other tradesmen and professionals too numerous to particularize, we realise at once that, however energetic he may be in the acquisition of knowledge and in the performance of his duties, he can never be safe without a considerable ballast of tact, discre-

ion, and common sense. It is knowledge of detail, be it observed, which a 'oung inspector most lacks and most requires.

Common sense is an essential for all of us if we are to achieve success. This most uncommon of natural qualifications has been defined as a right ense of common things, and let this definition suffice us here, but it ignifies to me very much more than this. Those of you who have it will :now what I mean, but to those who have not, no amount of explanation ould make it plain.

I have not come here to-night to preach a homily, but the influence f an inspector at his best is such a power for good in the community, hat I am constrained to linger for a moment upon the moral note. The sanitary inspector is above all things a health missioner, and many hings besides simple ardour and zeal are necessary for a successful nissionary.

Honesty, sympathy, courtesy, love of our fellows, indomitable patience, nergy and courage, a love of work for work's sake, and a devotion to duty re the characteristics of a gentleman. This noblest work of God is found n every clime and in every social grade. There is no reason why an nspector should not be a gentleman or a gentleman an inspector, and hen such a combination occurs (and I am pleased to say I have known : occur pretty often) the advantage to the community in which he abours is great and lasting.

We are learning much from the Japanese, now-a-days, and those of ou who would obtain a faint insight into the moral heart of that great eople should read an article on the "Soul of a Nation," which appeared n the *Times* on October 4th, 1904. The cult of Bushido in Japan has een inadequately translated as that of knightly chivalry. The following s a brief extract from the article I have mentioned:—

> "If we cannot adequately express all that Bushido is, we can say what it is not. Take the average scheme of life of the average society of the West, and Bushido, as nearly as may be, represents its exact antithesis. Bushido offers us the ideal of poverty instead of wealth, humility in place of ostentation, reserve instead of réclame, self-sacrifice in place of selfishness, the care of the interest of the State rather than that of the individual. Bushido inspires ardent courage and the refusal to turn the back upon the enemy; it looks death calmly in the face, and prefers it to ignominy of any kind. It preaches submission to authority, and the sacrifice of all private interests, whether of self or of family, to the common weal. It requires its disciples to submit to a strict physical and mental discipline, develops a martial spirit, and, by lauding the virtues of courage, constancy, fortitude, faithfulness, daring, and self-restraint, offers an exalted code of moral principles, not only for the man and the warrior, but for men and women in times both of peace and of war."

Remember the words of our own poet, Pope:

> "Honour and shame from no condition rise,
> Act well thy part, there all the honour lies."

As I am speaking to Associates of The Royal Sanitary Institute, I shall not refer except incidentally to the qualifying Examination of the Institute or to that of the London Board. I shall surmise that all have passed one of these preliminary tests of fitness.

With this preface, I will now proceed to consider in some detail the official instructions given by the Local Government Board to an inspector of nuisances regarding his duties.

In the first place he is told that he must perform the duties assigned to him by the Public Health Act, 1875, and other sanitary statutes, and by the Orders of the Local Government Board, either (1) under the special direction of the sanitary authority, or (2) (if so instructed by the latter) under the directions of the medical officer of health, or again (3), where no such directions are required, without such directions.

It is, I think, hardly necessary to point out that a knowledge of sanitary law, so far as it bears upon his duties, is absolutely essential to the inspector, if only to tell him what his duties are. The model by-laws, also, are a valuable guide to the inspector even when not in force in his district. These by-laws establish a reasonable standard with regard to various matters coming within the inspector's daily cognizance. The scope of the latter must of course vary widely with the character of his district. In a sparsely inhabited rural area, he will have very different duties from those falling to him in a city slum.

Again, in an industrial urban district with many workshops and factories, his functions will for the most part be entirely diverse from those in a residential suburb.

The presence or absence of such things as canals, common lodging-houses, dairies and cowsheds, piggeries, public abattoirs, private slaughter-houses, and public markets, the particular methods of excrement disposal and of general scavenging in use, and a thousand other factors which you can imagine for yourselves by thinking of the characteristics of neighbourhoods you know of throughout the country, will necessarily make the widest possible difference to the work an inspector is called upon to perform.

The differences in an inspector's work occasioned by a diversity of conditions such as I have suggested are indeed so great as sometimes to produce bewilderment and even dismay to a thoughtful and conscientious official of this class at the outset of his career.

It should be remembered that there is a considerable difference between the legal powers conferred by public health legislation upon urban and rural authorities respectively. The distinction, however, between the powers bestowed upon the two classes of districts and authorities is clearly drawn by the Public Health Acts.

I have said in my remarks on sanitary law that a general knowledge of the scope of his duties is essential to an inspector, and the inference from my later observations is that a thorough knowledge of his district and its characteristics (viewed from a sanitary standpoint) is equally desirable, that he may know in what directions his official energies are likely to find occupation.

Now, with regard to the knotty question of how far he is to look for special direction from the sanitary authority and the medical officer of health, and how far he is to rely upon his own knowledge, discretion, and judgment in the performance of his duties. The Local Government Board are often blamed for speaking so vaguely upon this point, but a moment's consideration of the extraordinary differences between sanitary authorities and sanitary districts, and the equipment and organization of their health departments, will convince any thoughtful person that they could hardly have done otherwise than put the matter as they have. In some districts the medical officer of health is paid only a small annual retaining fee (perhaps as little as £5 per annum) and is expected to give an opinion only when specially called upon to do so, whereas the inspector is practically left in sole charge, and is paid, and expected, to devote his whole time to his duties.

Again, in some districts it is the practice of the local authority to appoint sub-committees to conduct inspections, with or without their officers, while in others such action is disapproved as tantamount to keeping a dog and doing one's own barking.

Again, in other districts, like those of our large industrial centres, the Health Department is a large and well organized machine with a numerous staff. In such a district the ordinary individual inspector is simply one personal unit among many, acting (probably in some special capacity) either under the medical officer of health or a chief inspector. These extreme instances will serve to indicate how greatly the inspector's duties and powers of initiative may vary in different places. In whatsoever district, or character of district, you may happen to find yourself, let me advise you, in the absence of distinct abuses affecting your office, injurious to your own or the public interest, to carry out the duty assigned to you to the best of your ability, without endeavouring to adjust your official

relations according to your own preconceptions. The inspector has a most important and responsible position to fill and duties to perform, but he is not (usually at least) a scientific expert, and, if he be wise, he will bear this last fact steadfastly in mind. We none of us know too much about the scientific aspect of our work, but remember that it is only by such knowledge that our work can have sure foundation. The Japanese, Americans, and Germans, especially, among our contemporaries, are continually reminding us of the fact that applied science is the safest guide, the surest foundation in this regard. Some inspectors remind me at times of the kite in the poet Cowper's poem, which tried to fly without a string, and came to grief in consequence. It is the rule-of-thumb practice of sanitary inspection in the past which has brought so much reproach upon the inspector's office, and has led people to think and say that anyone was good enough to be an inspector of nuisances.

My advice to you is, that you should not endeavour to run too much alone, at any rate until or unless you are reasonably sure that you are running in the right direction. In some districts I know of (*e.g.*, Birmingham and Edinburgh) medical officers of health have been appointed chief sanitary inspectors, in order to insure that the inspecting staff shall have reliable scientific direction in the performance of their duties.

The inspector is directed by the Local Government Board Memorandum to attend all meetings of the local authority when so required. In the case of ordinary inspectors this attendance will be required only on special occasions, except in small districts where the inspector is in a more or less independent position under the local authority.

I know that many inspectors regard the attendance at Committees and Councils as a great privilege, but I can assure you it is often a disadvantage and hindrance, both to the inspector and to his work. A man is quite as likely to make enemies as friends on the Committees by coming into close contact with the members, and his work under such circumstances will often be interfered with, whereas in his absence it would be passed and approved without comment.

I have already spoken of the necessity for the inspector to make systematic and regular inspection of the district or section of work for which he is appointed. This inspection will not only keep him informed upon various matters (nuisances and the like) over which he has supervision, but also, if he act wisely, establish him in the public respect, and exert a moral influence upon potential offenders against Public Health Acts, regulations, orders, and by-laws. His influence will be analogous to that of a police patrol in a disorderly neighbourhood.

The inspector's reports to the sanitary authority should be in writing or type-written, should be brief, definite, and to the point. His recommendations should be clearly stated, and in all important matters he should endeavour to secure their entry on the minutes. This is desirable as a personal safeguard for the inspector in case of a public inquiry into local sanitary administration.

Continuing our review of the Local Government Board Memorandum, we find that instructions are given to the ordinary inspector regarding his duties: (1) when notified of the existence of a nuisance, or of the breach of any by-laws or regulations made by the sanitary authority for the suppression of nuisances; (2) in dealing with offensive trades and breaches of by-laws and regulations made in respect of such trades; (3) in safeguarding works of water-supply, and preventing fouling and waste; (4) in the inspection of food-stuffs intended for the food of man, sold or exposed for sale (P.H.A.A. Acts), and the seizure, condemnation, and destruction of such as appear to him and the Medical Officer of Health and a Justice of the Peace to be unfit for such use; (5) in the taking and submitting for analysis samples of food, drink, and drugs under the Sale of Food and Drugs Acts. Now, we have here set out only a part of the special functions which may devolve upon a single inspector, although most sanitary authorities who take themselves seriously have come to realize the necessity of appointing more than one officer where there is any considerable amount of work to be done under these numerous headings.

In order to remind you once more of the various functions of the inspectorial staff in a large city, I will now enumerate the principal inspectors employed in a large and well organized urban health department in the provinces. Here we have—

1. The district inspectors of nuisances, say 1 inspector to each 40,000 inhabitants (see sec. 91, Public Health Act, 1875);

2. The meat and provisions and slaughterhouse inspectors (sec. 116, Public Health Act, 1875);

3. The local workshop (and, to some extent, factory) inspectors (Factory and Workshops Act, 1901) and shop hours act inspectors (Shop Hours Act);

4. The canal boats inspector (Canal Boats Act, 1877, and Regulations, 1878);

5. The common lodging-house inspector and inspector of houses let in lodgings (secs. 76–80, Public Health Act, 1875, and sec. 90, modified by sec. 8, Housing of the Working Classes Act, 1885);

6. The inspector or inspectors under the Sale of Food and Drugs Acts, with unofficial assistants (Sale of Food and Drugs Acts, 1899);

7. The infectious diseases inspectors, with disinfecting staff (sec. 120 and onward, Public Health Act, 1875, and Infectious Diseases Prevention Act);

8. The health visitors appointed usually as inspectors of nuisances, but serving in a new capacity as school and home visitors among the poor.

I have excluded from this list such offices as those of petroleum, hackney-carriage, and market inspectors, because they are more commonly under a police than a sanitary committee in large towns at least.

The Memorandum goes on to instruct the inspector that he must promptly notify the medical officer of health of any cases of epidemic disease which may come to his knowledge, and also take his direction for the measures of prevention to be adopted.

Next we come (in the Local Government Board Memorandum) to the official instruction as to the keeping of a diary and other books, constituting a continuous record of inspections made, of work done, and of the condition of premises in respect of which it has been undertaken. The books kept in a well-organized health department are very numerous, and a useful knowledge of these can only be acquired by a careful study of the books themselves. The most important are:—

Nuisance books, letter books, note books, and files.
Infectious diseases registers (one for each disease).
Common lodging-house register.
Canal boats register.
Workshops register.
Outworkers register.
Slaughterhouse and knackers' yards registers.
Offensive trades register.
Dairies, cowsheds, and milkshops register.
Margarine makers register.

The Local Government Board Memorandum next requires that the inspector shall at all reasonable times produce, on request, to the medical officer of health, all or any of his books, and give him besides any information at his disposal relating to matters coming within the scope of the inspector's duties. This requires no comment. The two officers could not work together without some such provision.

Next, he is instructed, if so required by the sanitary authority, to superintend the due execution of all works undertaken by their direction for the abatement of nuisances. Notice the proviso "if so required."

Now, if the inspector is without architectural or engineering training he is clearly incompetent to undertake the supervision of works of construction appertaining to either of these professions, and it is far better for him and for all parties that he should have associated with him a person who has had such training to supervise the work undertaken in obedience to his (the inspector's) notice. In small districts, and especially in rural districts, the offices of surveyor and inspector are often combined in one appointment, but usually in large urban districts either a qualified surveyor is appointed in the health department to undertake such supervision, or the latter is left to an officer in the town surveyor's department.

The question of the supervision of the work carried out under notice from the inspector has given rise to a great deal of discussion in different places from time to time, but I think the above is a fair general solution.

The next section of the Memorandum instructs the inspector, when so required by the sanitary authority, to act as their officer under the Contagious Diseases (Animals) Act, and its orders and regulations. I have had some experience of the working of this Act and the orders and regulations made under it, and am of opinion that their administration is best undertaken by the police, aided by a veterinary surgeon; and this, I believe, is also the view of the Board of Agriculture. Many inspectors are required for this work, and every policeman on duty can be called upon, if necessary, to act as an inspector for this special purpose.

The Memorandum concludes with an order to the inspector to do the lawful bidding of the sanitary authority and the Local Government Board in other matters, not here set down but appertaining to his office.

So much for the duties of an inspector after appointment. Let us now consider briefly how he may best qualify himself for their performance by training and instruction acquired beforehand.

Under existing conditions it is a very difficult thing for an inspector to obtain any useful amount of training before appointment. The regulations of The Royal Sanitary Institute require that every candidate for its diploma shall have obtained a certain amount of practical insight into the office and outside work of a sanitary inspector, before presenting himself for examination: the London Sanitary Inspectors' Examination Board, moreover, demands that he shall have held for three years prior to 1900 the post of sanitary inspector in a sanitary district of the United Kingdom having a population of not less than 5,000 inhabitants, or have attended thirty-two systematic lectures with demonstrations. But no one seriously thinks that either of these courses, except perhaps the first condition of the London Board, is sufficient to give the candidate an effective

grasp of his duties in practice. When one reflects as we have this evening upon the grave responsibilities frequently devolving upon the office of inspector, and then considers the amount of preparation which the average inspector undergoes before appointment, one is immediately struck with the extreme inadequacy of this preparation. Many remedies have been suggested, but none is quite satisfactory. The crux of the whole matter is want of means on the part of most of the candidates to enable them to support themselves during the necessary period of preparation. It is, of course, out of the question that with the comparatively small reward in the way of salary which an inspector candidate has to look forward to, that he should devote so long a period to study and preparation as, say, a doctor, an engineer, an architect, or a lawyer, before earning a living wage. But I would suggest the general adoption of a plan which, theoretically at least, is unobjectionable. I refer to a system of apprenticeship, assistantship, and subsequent promotion. An apprentice can be employed at a small salary as a general inspectorial understudy in the district, and the length of his tether should be increased with the growth of his capacity for running alone. In most trades and professions this system is adopted for the education of their youthful members, and it usually works exceedingly well. There are, of course, practical difficulties in the way of the general adoption of it for sanitary inspectors. It will, for instance, often be difficult to find room for beginners in well-equipped health departments, except on the distinct understanding that they must look elsewhere for permanent employment; but, once adopted, the plan works well, for men who have served as assistants for some time in a well-known and well-equipped district have less difficulty in obtaining a permanent appointment than candidates without such recommendation.

I have purposely avoided non-essential details in my address to-night, because I have only one address to deliver and much general ground to cover; but I must say a few words upon the subject of after-study for an inspector. Never be ashamed to learn. Knowledge brings power, comfort, courage, and advancement. Whatever you are most deficient in, endeavour to work up by private study, by attendance at evening classes and lectures, and other means of instruction available. Keep your eyes and ears open when going your rounds, and endeavour to note and look up things you do not understand. Industry and a conscientious and intelligent sense of duty will bring their own reward, for if by doing your duty to the best of your ability you do not achieve as much material success as you deserve, you will at least have the comfort of knowing that you have done for others

and for yourself the best that lay in your power, and this knowledge, according to one of our greatest philosophers, is the highest reward of such noble action.

Now just a few words in conclusion upon the much-discussed question of how far provincial officers are liable to suffer, under existing conditions, for the impartial performance of their duty. Of course, we all desire fixity of tenure, and, what is more to the point, we are going to have it before long. But I wish you to know that, in my experience (extending over more than twenty years), a conscientious officer, whether inspector or medical officer of health, is much less likely to suffer for the diligent and straightforward performance of his duty than from its neglect. I could tell you of many instances in which officers have been almost universally respected and well rewarded for the efficient and impartial discharge of necessary but unpleasant duty, but I know of very few indeed where they have suffered loss from this cause.

MUNICIPAL MILK DEPOTS & MILK STERILISATION.

By G. F. McCLEARY, M.D.Cantab., D.P.H.,
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(MEMBER.)

Read at Sessional Meeting, March 25th, 1905.

THE title of this discussion, which I have had the honour of being asked to open, Municipal Milk Depots and Milk Sterilisation, seems to me hardly to indicate with sufficient precision the subject which we are here to discuss. A municipal milk depot is a depot for the supply of municipal milk, and municipal milk is not necessarily specially-prepared infants' milk supplied in a separate bottle for each meal. It is true that this is almost the only kind of milk which is supplied by the ten municipalities to England and Scotland that have established milk depots, but there is nothing in the nature of things to limit the operations of a municipal milk depot to this specialised and costly method of supply: on the contrary, there are very good reasons why there should be no such limitation. Still, I think I may take it that the kind of municipal milk depot we are here to discuss is the kind of depot which already exists, namely, the municipal infants' milk depot, and to that kind of depot my remarks will chiefly have reference.

The first municipal milk depot in this country was established in 1899 by the St. Helen's Corporation. Since that year similar depots have been opened by the municipalities of Liverpool, Ashton-under-Lyne, Dukinfield, Battersea, Leith, Bradford, Dundee, Glasgow, and Burnley, and by two private associations, the York Health and Housing Reform Association and the Finsbury Social Workers' Union. All these depots (with the exception of the Finsbury institution, which differs from the other depots in some respects) are conducted on similar methods. In every case the milk is supplied by a contractor, and in nearly every case, as in Battersea, the source of the milk supply is inspected and controlled. On arriving at the depot the milk is strained, modified, bottled, and then sterilised or pas-

eurised. Each child receives from six to nine bottles daily, and the quantity f milk in each bottle is sufficient for one meal and no more. The bottles re supplied in wire baskets, each basket containing one day's supply, and ot more than one day's supply is given out on any one day, except on aturday, when, in some depots, Sunday's milk is also supplied. The milk is iven to the baby from the depot bottle through a short rubber teat upplied at the depot, and as each meal is in a separate bottle a "feeding ottle" becomes unnecessary. This alone is no small advantage. The omes of the milk-consumers are visited by lady inspectors, who endeavour o insure that the milk is properly used, and efforts are made to induce he mothers to bring the babies periodically to the depot to be weighed. Every opportunity is taken to impress upon the mothers that the milk, ike all artificial foods, is but an imperfect substitute for mother's milk, nd that it should never be used in preference to mother's milk.

The object of the municipal infants' milk depot is to reduce the heavy nfantile mortality dependent upon improper infant feeding. We know, of ourse, that mother's milk is immeasurably the best food for babies, and hat a baby should receive nothing but mother's milk for at least the first ine months of life, but we know also that in many cases mother's milk is ot available, and that an increasing number of children must either be ed artificially or not at all. Cow's milk is the least objectionable substitute for mother's milk, but many children in our poorer districts hardly ver taste cow's milk; they are fed on condensed milk and cheap proprietary oods. Moreover, cow's milk as usually supplied in this country may be, nd often is, a source of grave danger. It is often grossly contaminated, he contamination taking place on the farm, in transit, in the milkshop, n the milk-round, and last, but certainly not least, in the home of the onsumer. Dr. Newsholme and Dr. Meredith Richards have brought orward strong evidence for the opinion that the home-contamination of nilk and other foods is a most important factor in the causation of ummer diarrhœa; and the prevention of home-contamination must be an ssential part of any effective scheme for the reduction of the infantile nortality dependent upon improper infant feeding. By supplying milk n separate bottles, each bottle containing sufficient for one meal and no nore, the danger of home-contamination is minimised, for the bottle is not pened (or, at all events, need not, and should not, be opened) until the aby's feeding-time has arrived.

The heating process to which the milk is subjected at the depot neuralises largely, if not wholly, the initial contamination, and as the milk s supplied in separate bottles the number of meals in the twenty-four

hours and the proper quantity for each meal are clearly indicated, and the danger of over-feeding is, therefore, minimised. In addition to these advantages a properly-conducted infants' milk depot is an important educational influence. It is a striking object lesson in methods of artificial infant feeding, and it performs a useful function in rousing public interest in the important problem of the prevention of infantile mortality.

The methods upon which the infants' milk depots in this country are conducted are not, in my opinion, entirely satisfactory. In the first place, we should endeavour to remove the necessity for sterilisation. We must never forget that mother's milk is the proper food for infants, and if mother's milk is not available we must find a substitute which resembles mother's milk as closely as possible. Now, mother's milk is not a cooked food, and our aim should be to supply cow's milk in an uncooked state. This, of course, involves the ownership of the cows. No medical officer of health in his right mind would recommend a sanitary authority to supply raw cow's milk unless the whole of the processes involved in the production of that milk were placed under the effective supervision and control of the responsible officers of the sanitary authority. Such effective supervision and control can only be secured by the direct ownership of the means of production. If the sanitary authority controlled the whole of the processes of production "from the cow to the consumer" it would be possible to fulfil the following conditions, which should, in my opinion, be fulfilled in all municipal milk depots:—

1. The municipal dairy farm should be in the country, but not too far from the town, and the municipal cows should be healthy and they should live in the open air as much as possible. The sanitary condition of the farm should, of course, fulfil the strictest requirements.

2. The cows should be milked in the open air, and the whole process of milking should be performed with the strictest aseptic precautions, and should be supervised by an officer trained to appreciate the importance of asepsis in surgery.

3. Immediately after milking, the milk should be cooled down rapidly to a temperature not higher than 40° F.; it should be modified if necessary, and then promptly bottled.

4. The bottles should be packed in ice, placed in a specially constructed motor wagon, and conveyed to the distributing centres in the town.

These are the methods upon which a municipal milk depot should be conducted. If they seem Utopian, all I can say is that they are in operation to-day in the city of Rochester, in the State of New York. In 1897 the municipality of Rochester began a supply of milk for infants on

methods similar to those at present adopted in our own depots. At first the milk was sterilised, then pasteurised, but in 1899 the following methods were adopted. I quote from an article by Dr. George W. Goler, the Medical Officer of Health of Rochester:—

"A central station at which the milk is prepared is organised each season on a farm outside the city, where a trained nurse and assistants have full control of the cows, utensils, bottles, etc., and where all of the milk work is carried on in a portable milk laboratory. Everything coming in contact with the milk is thoroughly sterilised in steam sterilisers. The milk itself is not subjected to any pasteurising or sterilising process. Sterilising and pasteurising are only an open invitation to the milkman to be careless in the production and handling of milk.

"At the milk station on the farm the milk is taken from clean, well-fed, tested cattle into sterile cans, which are carried to the barn in sterile cheesecloth bags. Just before milking the cows' udders are washed. A sterilised cheesecloth fly cover is placed over the cow, the first portion of the milk being rejected. So soon as the cans are filled they are immediately covered by a layer of cheesecloth held in position by a rubber band. The cans of milk thus covered are immediately taken from the barn into the laboratory, about 200 yards away, where the milk is properly diluted, sweetened, and turned off into sterile nursing bottles of various sizes of the Siebert type. The bottles are corked with sterile rubber corks, placed in racks, covered with cracked ice, and immediately transferred to the city for use. Of the cleanliness of milk prepared in this way, forty-three daily samples were found to average not more than 14,000 bacteria per cubic centimetre, while the city milk for the same period approximated 235,000 bacteria per cubic centimetre." *

If this can be done by our American cousins I do not see why we Britishers should allow ourselves to be left behind. If these methods were adopted, not only would our municipal milk supplies be greatly improved, but a practical object lesson in clean milk production could be given. We could give the dairyman what we have already given the builder, namely, a working model for him to copy. At the municipal dairy farm the dairyman would be made welcome to study aseptic methods of milk production, and such an object lesson could not fail to effect a considerable reform in the present deplorable methods upon which milk is produced in this country.

* "The Influence of the Municipal Milk Supply on the Deaths of Young Children," Dr. Goler, Health Officer, Rochester, N.Y., U.S.A., *New York State Journal of Medicine*, December, 1903.

Another defect of the British milk depots is that practically no provision is made for the effective individual medical supervision of the children. In the French institution—the *Goutte de Lait*—which may be regarded as the precursor, and to some extent the prototype, of our milk depots, the medical supervision of the children is the most important feature of the work. In most of the *Gouttes de Lait* the milk is supplied only on the condition that the baby is brought to the depot once a week to be weighed and examined by the medical director of the institution. This is not the case in our depots; but on the other hand we have, what most of the *Gouttes de Lait* have not, a domiciliary visitation of the milk consumers by lady inspectors or health visitors. I regard this part of the work as most important and most valuable. In our depots we endeavour to secure the supervision of the medical family attendant rather than to appoint a municipal doctor to give gratuitous advice. It is obvious that there are difficulties in the way of the latter plan, but still, it cannot be denied that the value of our depots would be much increased if a regular medical consultation formed part of the work, especially if the consultation were open to nursing mothers. In this way the milk depot could be made a nucleus for an organization for the encouragement of breast-feeding. Such an organization is badly needed in this country. In the encouragement of breast-feeding we have much to learn from the French.

What are the causes of the inability of mothers to suckle their babies? Whatever may be the case amongst the well-to-do classes, there can be no doubt that amongst the poor one of the most important causes is the mal-nutrition of the mother. Every doctor who has practised amongst the poor knows that bread and tea is the diet upon which many a poor mother has to subsist, and it need not surprise us to find that on an inadequate diet of bread and tea "the milk goes." The feeding of the mother during the periods of pregnancy and suckling is an important factor in the prevention of infantile mortality. The best way to humanise cow's milk is, as Dr. Sykes has pointed out, to pass the milk through the human mother. We could increase enormously the usefulness of our municipal milk depots by supplying, at a reduced price, pure milk to mothers who could bring forward satisfactory evidence that they were suckling their babies, and who would undertake to bring their babies to the depot periodically to be weighed and examined.

In addition to nursing mothers and to young infants for whom breast-feeding is impracticable, there is a third class of milk-consumers who stand much in need of pure milk. These are the older children who have passed the age of breast-feeding. Infants between nine and twelve

months are not usually wholly breast-fed, and children over twelve months need not be breast-fed at all; but for several years after the completion of the first year cow's milk is a most important food. For these older children, however, it is not necessary to adopt the costly method of supplying each meal in a separate bottle—it would suffice to supply the milk in pint bottles.

The conclusions of this paper may be stated as follows:—

1. Municipal milk should not be sterilised milk, but clean milk produced under the strictest possible aseptic precautions. The production of such milk involves the ownership of the cows.

2. Municipal milk should be supplied primarily to three classes of milk-consumers—

(*a*) Nursing mothers.

(*b*) Children over nine months old. Such children would not, in most cases, be breast-fed—at all events not wholly breast-fed.

(*c*) Infants under nine months for whom breast-feeding is impracticable.

3. It should be the object of the municipality to increase class (*a*) so as to diminish class (*c*).

DR. GROVES (Isle of Wight) expressed general agreement with the views enunciated in Dr. McCleary's paper. Human milk was the only proper food for infants. The fashion which comes from above, as all fashions do, of shirking the duties of maternity, is being followed to an increasing and alarming extent amongst all classes. Women should be dealt with sternly in this matter, as the children they produce are part of the assets of the State. If, however, children must be brought up by hand it should be on fresh clean cows' milk, and not on the milk distributed at the present time by certain municipalities. The conditions under which milk is collected in this country, especially by small dairymen, is simply too awful. One would welcome municipal dairy farms, if only as a means of education and example in the rural districts. As a medical officer of health his sympathies extended beyond children under one year of age to the whole community, and, municipal trading or not, the people at large will have to be protected against the risks they run from milk.

DR. E. WALFORD (Cardiff) said it is of course perfectly obvious that in a community with a declining birth-rate, the diminution of the infant mortality is

a social question of the first importance. It is to be regretted that, notwithstanding all our efforts, this mortality shows little or no signs of decrease, and in fact, in many localities there is a decided increase. All observers agree that the death-rate amongst breast-fed infants is low as compared with that amongst infants artificially fed. Even if artificial food of the most suitable kind and completely sterile were given, it is not likely that the results would be as satisfactory as when the natural food from the mother's breast is supplied. There is a danger therefore that these municipal milk depots will be resorted to by ignorant people, who may fancy that milk supplied under such favourable conditions is superior to the natural food, and who may thus be encouraged to evade their maternal responsibilities. He was of opinion that if the municipality undertakes the supply of milk, it should do so strictly under medical supervision. That the depot should be, in fact, in connection with some medical charity or institution, the outpatient department of a hospital or infirmary, as only under such circumstances could the supply be restricted to suitable cases. It is acknowledged, of course, that this form of municipal trading is carried on at a loss. If, therefore, a loss is to be incurred, it would, he believed, be far better for the municipality to undertake the complete supervision of the milk supply from the cow to the child. Placing the farmers and contractors under a written agreement to carry out certain sanitary regulations may be of use, as far as it goes; but after all, this is an incomplete supervision, and one which apparently does not altogether commend itself to the trade. A far better arrangement would be for the municipality to conduct and control on scientific lines dairy farms on a large scale. This could doubtless be managed, even if the dairy farm were outside the city or borough, controlling the transit and delivery of the milk throughout. Milk supplied under cleanly and aseptic conditions would not require sterilisation, and the modification or humanization, if necessary, could be carried out at the municipal depot under medical supervision. He agreed with Dr. McCleary that this want of medical supervision of the milk, and of the infants supplied with it, is the weak point in our English system of municipal milk depots.

Dr. John Robertson (Birmingham) said he was strongly impressed with the necessity of having further investigation made in regard to the question of feeding of infants. In the first instance it was necessary to find out whether it was possible to get a much larger percentage of children to be naturally fed than at present was obtainable. He did not doubt, however, that a large number of mothers were unable to provide their children with suitable milk. This inability on the part of mothers to fulfil a natural function was not by any means entirely due to mal-nutrition from want of food, because it was met with in a large proportion of cases among the middle and better classes where mothers were if anything over (rather than under) fed. He agreed thoroughly that if it were possible to

supply unsterilised milk it was desirable to do so, but under ordinary conditions in this country he did not think that a milk could safely be prepared which would remain sufficiently good for 36 to 48 hours without some amount of destruction of the bacteria by heat or other means. He did not know the conditions as to temperature, etc., which were in operation when the samples of milk were collected at Rochester. It was physically possible to obtain from the cows, milk which was sterile, but such milk was a scientific curiosity, and he did not believe that under any conditions it could be produced on a wholesale scale. Milk depots had undoubtedly been of great service, but apparently the trouble involved in fetching the milk, its expense, and the supervision entailed prevented many people making use of them. He thought that the depot at St. Helen's was waning in its usefulness rather than increasing. As regards the actual production of scurvy by sterilised milk, possibly more had been made of the cases recorded than was necessary. It had not been proved satisfactorily yet that the sterilisation of milk was the reason of the scurvy in the few cases which had been reported. If the partial sterilisation which takes place at the depot damages milk in such a way as to give rise to scurvy, it was reasonable to expect that nearly all hand-fed children would be liable to this disease, as the milk in each case was boiled or otherwise damaged by heat.

MR. W. E. MANCHESTER (Editor of the *Dairy World*) said there was one prominent consideration underlying the movement in favour of municipal milk depots, and that was the reduction of infant mortality. Various reasons had been advanced for the excessive nature of that mortality. They had been told by men like Sir James Crichton Browne that the great infantile mortality, which they all deplored, was due to the use of milk *substitutes*. Dr. Newman specifically mentioned condensed skim milk as the cause of the mischief, and further spoke of overcrowding as a contributing cause. Sir Lauder Brunton, who had expressed himself at Manchester as being unfavourable to municipal milk enterprise, gave as the reason for the high death-rate the feebleness of young mothers who worked up to within a very short time of the birth of their offsprings. Other medical men had attributed the excessive mortality to boy and girl marriages. There were all those causes put forward, and yet they were invited to believe that the establishment of municipal milk depots was going to be a remedy for them all. He contended that those institutions had not accomplished the purpose for which they had been founded. Citing the case of St. Helen's, the home of municipal milk, he pointed out that, despite the exceptional efforts made to popularise the depots, according to one daily paper "the infantile death-rate remained very high, and at a recent meeting of the Health Committee the members spoke in *almost a despairing tone* of their efforts to educate the mothers of St. Helen's in the delicate duty of bringing up their children." The Medical Officer of Health for Leith had reported that he found it "impossible to declare that the efforts of

the municipal milk depot had resulted in bringing about a decline in diarrhœa mortality among the young," and that the deaths from that cause were fewer in the year preceding the institution of the depot than in the following year. The case of Battersea was of particular interest. It had been shown that during the year 1902, when the milk depot was established, the infant mortality had decreased; but was that not also the case with other districts of London where no depots existed? The fact was that the reduction was due to the exceptionally mild summer, and was not peculiar to those districts where municipal milk depots were established. In the following year, taking the first nine months to cover the summer period, the mortality in Battersea had increased from 123 to 133 per 1,000, while in other boroughs, such as Stepney, Bethnal Green, Wandsworth, St. Pancras, and Fulham, where there were no milk depots, it had decreased to the extent of from 10 to 18 per cent. The much paraded figures of the Liverpool depot were, he contended, most misleading. He questioned the possibility of obtaining accurate information with regard to depot-fed children, but it was only natural that they should show a lower mortality, for their number was exclusive of children who did not survive their birth more than a few hours or days, and also of the children of the very poor, who could not, or would not, avail themselves of the depots, and among whom the mortality was greatest. Many of the municipal depots, other than those referred to, had been compelled to acknowledge their inability to reach that class, and Dr. Ashby of the Manchester Hospital for Children had also drawn attention to the same fact. In that circumstance was to be found the weak point of the municipal milk movement. The people who, in the main, used the depots were those who were well able to purchase milk through the usual channels, and the intervention of the municipality furnished a form of competition which was undoubtedly injurious to the dairyman. Touching upon the question of the purity of milk, he maintained that the conditions, both of production and distribution, were better to-day than ever. The local authorities were armed with powers for insuring healthy and sanitary conditions at the farm, and the Local Government Board had vigorously taken up the matter in conjunction with the Board of Agriculture, with the result that all over the country, where steps had not already been taken, regulations were being framed with the object of securing the immunity of milk from contamination, and were being enforced with sometimes needless rigour. If the efforts of those present were directed to bringing pressure to bear on defaulting authorities in that connection they would be accomplishing a useful purpose. The need of the children of the poor was, undoubtedly, a sufficiency of fresh milk, and he concurred in the view of Dr. Walford, that if it was found that parents had not the means of providing it, when the natural sustenance was unavailable, some means should be found for bringing it within their reach, either through the medium suggested by Dr. Walford, or through the dairymen themselves.

DR. H. COOPER PATTIN (Norwich) said that he was sorry not to have been in time to hear Dr. McCleary's opening speech, but with the précis in his hands there was much with which he could agree. To the contention that to enable a municipality to supply milk it was necessary that it should own the cows, he demurred, though he could appreciate the conditions under which such ownership would be desirable. His main interest in attending the meeting was to emphasise a conviction that he had held for a long time, viz.: that milk for domestic use should be *sold only in bottles* or other sealable vessels. He thought a statutory regulation to that effect, together with care and cleanliness at the source of supply, would solve the most pressing difficulties of the milk problem. With the help of a lady inspector he had been making inquiries into the home treatment of milk in 70 dwellings, in each of which a death from summer diarrhœa in a child under one had been registered; and found that in no less than 57 of them the milk was kept in open vessels in the living rooms! Under such conditions could they expect anything but contamination and even putrefaction. This brought him to another point he deemed to be of the greatest importance, viz.: the need for teaching to girls in the school the hygiene of the *home management of milk*. As to the extent to which a municipality might trade in milk, if it traded at all, he was of opinion that such trading should be limited rigidly to the standardizing minimum, anything beyond that being in his judgment the proper sphere for private trading. The reasonings which caused him to take these views of the proper treatment of the milk problem would be found set out in a little book on temperance and State hygiene which he was now seeing through the press. As to the decline in breast feeding, he thought they must expect an increasing tendency on the part of many at any rate of their women to cease to be milk producers. In many now the lacteal function was either very feebly developed, or was wilfully suppressed; the daughters of these mothers doubtless would carry the conditions a stage farther, and with time they might expect the virtual disappearance of the lacteal function in more and more of their women. Hence the importance of discussion on artificial methods of feeding, and hence also his claim for having our girls taught the hygiene of the home management of milk. There was a good deal to be said in favour of Dr. Sykes' plea for the encouragement of foster-mothering, particularly for the children of factory operatives. But for the present he would confine himself to urging two needs: (1) the teaching of the hygiene of milk in schools, and (2) a statutory regulation to the effect that milk for domestic use should only be sold in bottles or other sealable vessels. These with care and cleanliness at the source of supply would solve their difficulties in securing reliable distribution of fresh milk.

DR. J. F. J. SYKES (St. Pancras) thought that they were much indebted to Dr. McCleary and others for doing pioneer work in the attempts to stem the tide of infantile mortality. It was only through making mistakes that they

discovered the right course. A man who never made a mistake never made anything. When he first began to enquire into this question some years ago he started with the following conceptions: 1. That any measures with regard to improving the supply of cow's milk must embrace the whole supply of milk to the community. 2. That mothers frequently feed their sucklings on "what is going," and so largely contribute towards infantile mortality. 3. That the medical profession has the opportunity to advise, and advises pregnant and suckling mothers not to hand-feed their infants unless absolutely obliged to do so. These conceptions he had found to be wrong. He began at the opposite end of the pole to Dr. McCleary, but they had been gradually approaching each other, and coming to similar or parallel, although not identical conclusions. The object they had in view was the diminution of infantile mortality. This was *the cardinal point to be aimed at and to be borne in mind free from all side issues.* Statistics showed now, as compared with former years: (1) That a larger number of infants were born prematurely and died soon after birth; (2) that a larger number of mature infants were born so feeble as to live only a few weeks; (3) that a larger number of mothers did not suckle their infants when born; (4) that a larger number of mothers who suckled their infants for a few weeks weaned them too early; (5) that it was cheaper and easier to feed infants by the breast than by hand; (6) that it was simpler and wiser to cultivate the mother's health and improve the breast-milk than to supplement or supplant it by hand-feeding; (7) that the hand-feeding of infants was often unsatisfactory, always risky, and in the summer dangerous and often fatal. This question, the reduction of infantile mortality, was essentially a medical question. They must enlist the whole medical profession in the work. They must educate mothers to understand that they must cultivate their health during pregnancy to endow their offspring with sound constitutions, and to be capable of breast-feeding them when born. They must educate mothers to maintain their health and their suckling powers. They must educate them to seek medical advice before and after the birth of their infants, and not to wean them except upon medical advice seriously given. And when they had reduced the number of hand-fed children to the smallest proportion possible, then the remaining handful could be dealt with effectually. If they read the usual leaflets with reference to sucklings, they find generally *a line or two* advising breast-feeding, and *a page or two* detailing the mode of hand-feeding. This form of advice laid so much emphasis on hand-feeding, that it practically appeared to contemplate it in preference to breast-feeding. The essential points in a leaflet should be to advise all those measures that make for breast-feeding, and to advise *that premature weaning should not take place except upon medical advice.* The indications therefore were: 1. To improve the health of pregnant mothers. 2. To maintain the health of suckling mothers. 3. To exhaust all efforts upon the improving the health of mothers before concentrating attention upon sucklings. The measures that appear necessary are:—A (1) Weekly returns of births.

(2) Card of advice on above lines to every mother. (3) Visits by women inspectors to the poorest mothers. 4. (*a*) Referring well-to-do mothers to their medical attendants, and the poorest to the medical charities. (*b*) Obtaining the consent of the medical charities to accept women inspectors' cards as to the pecuniary condition of mothers. (*c*) Advising that no mother should prematurely wean her suckling except upon medical advice, and that such advice should not be given until all measures have been exhausted on the mother. 5. Reducing thus the number of hand-fed children to a minimum. B (1) The milk provided for hand-fed sucklings should only be supplied upon presentation of an order duly signed by a medical practitioner. (2) Cow's milk for sucklings should *only* be provided from a pasture-milk depot under aseptic conditions, carried out with the observance of the strictest cleanliness, refrigeration, and despatch (as at Rochester City, in New York State) and it is extremely unlikely that a dairy farmer would submit to such conditions, or produce milk under such conditions, as a private venture. He did not agree with Dr. McCleary and others in supplying milk for older children and adults from the special pasture depot. Adults and older children have alternative diets, but sucklings have only a milk diet to depend upon, it was a matter of life or death to them; and ordinary commercial milk, which could be consumed with less injury by adults and older children, was injurious and often fatal to sucklings in the summer-time. The want of cleanliness, refrigeration, and despatch by dairy farmers was such that it was hopeless to expect them to produce what in reality was a medicine or a medical necessary specially for sucklings, in spite of the immense improvements that have been made in the distribution of milk by the large dairy companies of London in the last decade, to whom the dairy farmers were like the Old Man of the Sea, as evidenced by the stringency of their milk contracts. If the advocates of municipal milk depots (not of the present type, but of the Rochester City type) were to confine their advocacy to the municipal supply of milk to *sucklings only*, which would be only an infinitesimal proportion of the great bulk of the milk supply, he felt sure that the great milk-distributing companies would look with a less unfriendly eye upon this medical necessary. The saving of infant life could scarcely be regarded as municipal trading. If the medical profession were to present a monster memorial to the Local Government Board, that the provision of pure, whole milk produced under aseptic conditions was a medical necessary for sucklings in want of breast-milk, then the Local Government Board could scarcely refuse its sanction to give power to municipal authorities under the provisions of the Public Health Acts to provide it as "medicine and medical attendance" to the poorer inhabitants of their districts. As to the cost; why was it that although the derivation of milk from greater distances must have increased the cost of transport the price had not risen? In his opinion the answer was that the corresponding measures of increased cleanliness, refrigeration, and despatch had not been adopted to the extent required. So that they got milk staler and more decomposing, or more dosed with

preservative chemicals, than when they derived their milk from cowsheds nearer their doors. This might not seriously affect the health of adults, but it undoubtedly did affect the health of suckling infants. Therefore the question reduced itself to this: Were they going to pay for the altered conditions with the lives of infants, or the increased cost of the production of special milk for sucklings? This was where the interests of the State and of humanity clashed with those of commerce. The problem seemed to him to reduce itself to two propositions: (1) To reduce the hand-feeding of sucklings to the smallest proportion; and (2) to provide pure whole milk, produced under strict aseptic conditions, for this small balance of hand-fed sucklings in order that they may live.

Dr. Armstrong (Newcastle-upon-Tyne) held that to seek the protection of milk consumers by sterilisation of milk, and the establishment of municipal milk depots, was to begin at the wrong end. The proportion of poor persons who could be induced to buy municipally-supplied milk at the price offered would probably be small, and the benefits to the population as a whole limited in extent. Such work on a large and general scale would imply a prohibitive outlay for a never-ending undertaking. Better eliminate tuberculosis from the herds of stock-breeders and dairy-keepers by the universal application of the tuberculin test with the prompt slaughter and destruction of every re-acting animal, young or old. The use of the tuberculin test was upheld by Sir Herbert Maxwell and other members of the Royal Commission on Tuberculosis. Although opposed to the compensation of owners for the destruction of tuberculous cattle as a general principle, he would allow its adoption during the experimental period, after which all tuberculous animals should in his opinion be put down at the expense of the owners or breeders. The general and energetic application of this course for a very few years would do away with the disease in cattle, and the necessity for any further expenditure from the public funds in connection therewith. Such a measure was vastly too great for any government department of merely political instincts and interests to initiate or carry through, unless forced into action by public opinion; but it might be brought about by the establishment of a national *Food Board* of representatives of the large sanitary authorities, charged with the duty of protecting the interests of the consumers of milk, meat, and other foods, and vested with power to give due effect to their views.

Mr. Nugent Harris (Agricultural Organisation Society) said he could not agree with his friend Dr. McCleary that the time had arrived for the starting of municipal milk depots. He was of the opinion that until every channel had been tried whereby the milk supply of towns could be levelled up, it would be unwise to go in for such depots. The question, "have we not tried all available channels?" would naturally be asked by those who favoured municipal depots.

:he speaker emphatically thought not, and submitted a very important suggestion or the consideration of the meeting, namely, Farmers' Co-operative Milk Supply Associations. On such associations he was convinced the foundations of municipal depots could be based. His chief reason for the assertion was the belief hat the enlightenment of the farmers as to the requirements of the Medical Officers of Health would be most readily accomplished by the establishment of co-operative supply rather than by any other methods. He gave the following nstance. Soon after the formation of the Skelldale Co-operative Dairy in Yorkshire, the committee decided in the event of an outbreak of infectious disease in the household of a member, that the milk from that farm should not be received until a doctor certified that it was safe to do so. The society also agreed to make good the loss to the member on the milk kept back, which was only reasonable. The speaker desired to emphasize what he considered the most striking point of the whole incident from the point of view of the present discussion, which was that this action was taken by a committee of farmers at a time when no pressure in this direction was put upon them; also that had they been working individually the produce of the milk would have been marketed without any control. The speaker thought that the farmers should be more in touch with the Medical Officers of Health. The farmers were not such impossible persons as some of the speakers imagined. He, the speaker, had had a good deal to do with them, and found them most willing to learn if they were approached in the proper spirit. He further suggested that if the co-operative principle were applied to the distribution of milk, as well as to its production, still more satisfactory results would ensue to the consumer and also to the public health.

DR. K. LUTOSLAWSKI (Warsaw) said if it be true that it was impossible to supply wholesome infants' milk without a loss, it would be useless to make model farms and encourage farmers to follow the set example, as no sound trade can work at a loss. The loss has to be made good either by philanthropy or by the ratepayer; he should think the former way, taken by Finsbury, is the proper one. But to him it seems that this question of an unavoidable loss is still open, and one should try to produce infants' milk without a loss, especially one way at any rate should be tried, that is the co-operative production by a co-operative body of consumers, not of professional producers. As in many other trades, so in this important milk trade, the consumer could possibly get the supply he wants at the present price in sacrificing the gain, which, in the present competitive organization of the trade, rests with the farmer. The chief tendency of the sanitary authority in that respect should go towards a much stricter supervision of the trade, improving the legislation and enforcing it efficiently. It is to be hoped that the English law will soon allow of the medical officer of health destroying on the spot all milk found not to be of prescribed quality. He remembered a notice referring, he thought, to New York, where in one summer night not less than 3000 churns of milk had been poured down the drains,

simply because the temperature of the milk was above 50° F.; such measures may efficiently secure the enforcement of the regulations.

Dr. Berry (Wigan) has sent the following note:—Municipal milk depots for supplying sterilised milk might be of the greatest service in Battersea, St. Helen's, Liverpool, Leith, etc., owing to the peculiar circumstances of the towns; Battersea having a large number of illegitimate children put out to nurse: St. Helen's a large number of mothers out working during the day; Liverpool and also Leith, he supposed, a number where poverty prevented the mothers from getting a sufficient supply of food for the child when unable to suckle. In Wigan they had sterilised milk supplied by private enterprise, but this did not meet with sufficient support. One would have expected it would have done so. Would a municipal depot have done more? He did not think so. Certainly the supply of bottles (in feeds) was good, but parents should be taught to measure the proper quantities themselves. Without going into the question of whether sterilised milk was the best artificial food for infants deprived of their mother's milk, should municipal authorities control the whole milk supply under their jurisdiction? They might do some good if this were possible, but what an undertaking! After this the meat, and also the bread supply would have to be municipalised. What they did want, however, in the meantime was the more thorough enforcement of the regulations under the Dairies and Cowsheds and Milkshops Orders of 1885 and 1886. These Acts were very feebly carried out in most towns and in rural districts, but in addition to the cleanliness of the shippons, they should have cleanliness of the cows themselves and of the milkers also. It was folly to allow milk to be contaminated at its source, and then afterwards cleansed by sterilisation. He believed with Dr. Robertson that many mothers, even amongst the lower classes, were unable to suckle their children from physical incapacity, and these ought to come under the care of their own doctor and not of the medical officer of health. They should also remember that milk should be properly stored and kept cool in the house, that contaminated milk was only one of the causes of infantile or zymotic diarrhœa, insanitary surroundings being another large factor. They saw infantile diarrhœa in breast-fed children, and also amongst those of the middle classes, so when they tried to diminish their infantile rate they must look to all causes, and not be led away by thinking that the milk supply alone was the only cause.

Dr. McCleary, in reply, said he could not agree that a nursing mother could take ordinary commercial milk with impunity. A recent outbreak of typhoid fever in Ealing afforded proof to the contrary. In reply to Dr. Cooper Pattin he said that he had never advocated sterilisation as desirable in itself. Sterilisation was merely a regrettable necessity. Until they owned the cows it would be necessary to sterilise the milk. The opinions as to sterilised

tion that he had put forward that day he had advocated in his Annual Report for 1903, in which the Rochester methods were described. He sent Dr. Cooper Pattin a copy of this report a year ago, so that he was surprised to find Dr. Cooper Pattin regarding him as an advocate of sterilisation. One of the great difficulties in the way of the production of pure milk by private enterprise was the question of cost. Milk should be cooled down to a temperature not higher than 40° F. immediately after being drawn from the cow; but how many farmers had the means to do this, or could afford to obtain the necessary apparatus? And if the farmer did obtain a cooling plant, and improved his premises in other ways, there was the possibility that the landlord would raise his rent. He had listened to Mr. Nugent Harris's account of the Harrogate experiment with much interest, and he wished the Agricultural Organisation Society every success in the good work they were doing. In conclusion, he urged that the best way to prevent the infantile mortality due to bad feeding, was to increase the number of breast-fed infants. There was need for more effort in this direction, and he thought that clergymen might do much good work by preaching breast-feeding as a duty the mother owed to her child and to society. But they must not forget that for many infants hand-feeding was a necessity, and for these infants he thought the milk depots were doing a good work.

NOTES ON LEGISLATION AND LAW CASES.

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RIVER.—*Continuance of Injury—Public Health Act, 1875 (38 & 39 Vict. c. 55), ss. 15, 17, 19, 299—Public Authorities Protection Act, 1893 (56 & 57 Vict. c. 61), s. 1.*

The River Derwent was polluted by sewage from (1) old sewers into which householders of Derby had for more than twenty years discharged their sewage; (2) sewers inherited by the defendants, the corporation of Derby, from their predecessors, into which householders had by virtue of their statutory rights made connections; (3) sewers laid by the defendants themselves; (4) additional sewage arising from the conversion of privies into water-closets under directions given by the defendants. The plaintiffs owned Alvaston Castle and Estate, situated on the river about five and a half miles below Derby, and brought this

action for an injunction to restrain the defendants from polluting the river so as to cause a nuisance; damages for the silting up of a lake fed from the river by a watercourse which had to be stopped up in 1902; the loss of a waterwheel which had been worked by the watercourse, and the expense of replacing it by an engine; pollution to a well into which water percolated from the lake; depreciation of a house on the bank of the river and to the Castle; the expense of obtaining a new water supply; and for injury to the fishing. In 1898 an order was made in the Derbyshire County Court, in an action brought by the County Council, that the defendants should abstain from polluting the river, contrary to the Rivers Pollution Prevention Act, 1876. By the Derby Corporation Act, 1901, the defendants obtained the necessary powers, and they had now commenced to construct sewerage works for the whole of their area.

Held, that, inasmuch as the householders had obtained in the first two classes of sewage prescriptive rights which could not be interfered with by the defendants, an order had been made under the Rivers Pollution Act of 1876, and the defendants were taking steps to remove the nuisance, no injunction ought to be granted; that the action would not lie against the defendants for non-feasance or neglect of duty under the Public Health Acts; the plaintiff's remedy against them in that respect was by complaint to the Local Government Board under s. 299 of the Public Health Act, 1875; s. 17 of that Act must be read only as a proviso; and s. 19 did not apply to the present case; that the action would lie against the defendants for damage caused by acts which they had done themselves; that this did not make the defendants liable for the whole of the damage; that the plaintiffs could recover damages for the expense of procuring a new water supply and engine, and for injury to the house and the fishing; they could not recover for injury to the amenities of the Castle nor for the silting up of the lake, for they ought to have excluded the water when they found it was polluted.

Continuance of injury under s. 1, sub-s. (a), of the Public Authorities Protection Act, 1893, does not mean damage inflicted once and for all which continues unrepaired, but a new damage recurring day by day in respect of an act done it may be once and for all at some prior time, or repeated it may be from one day to day; under that sub-section an action may be instituted within six months of the ceasing of the continuing injury; therefore the plaintiffs were entitled to recover for a greater period than six months, and up to the six years limited by the Statute of Limitations.

EARL OF HARRINGTON *v.* DERBY CORPORATION. Buckley, J. 205.

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E ROYAL SANITARY INSTITUTE

NOTES ON :INIMUM SANITARY REQUIREMENT FOR BUILDING BY-LAWS.

By H. D. SEARLES WOOD, F.R.I.B.A.
(FELLOW).

Read at Annual Meeting, March 22nd, 1905.

IHE agitation for a reform of the building by-laws, and the suggestions made at the Royal Institute of British Architects and the Surveyors' titute, seem to suggest that the subject might be approached from a ;htly different standpoint, namely, that of the minimum sanitary re-rements that can be asked for in buildings for human habitation.

In order to understand the position taken at these meetings, I give a *umé* of the Proceedings. Mr. Lacy Bridge made the following sugges-n for the form of by-laws at the Royal Institute of British Architects:

A. *Notice.*—Every person shall give notice in writing to the local thority who intends to erect—A dwelling-house; a factory; a building tended for the assembly of the public; any building situate within irty feet of a public highway.

B. *Width of Road.*—No person shall erect any building (other than a rch or covered way not more than one story in height) within twenty et of the centre of any public road or highway, as defined by the local thority.

C. *Open Space.*—Every person who shall erect a new dwelling-house ill provide in connection therewith an open space, exclusively belonging reto, equal in area at the least to the area of the building measured at ground-floor story. He shall also cause two sides, at least, of the

building to be lighted and ventilated from such open place or from a street or other public open space adjoining such building.

D. *Anti-damp Layer and Damp Course.*—Every person who shall erect a dwelling-house, a factory, or place for public assembly shall cause the whole surface or site of such building within the external walls to be covered with a layer of cement concrete, rammed solid, at least six inches thick, and shall provide an efficient damp course of sheet-lead, asphalte, or slates laid in cement in the walls or foundations of such building, or shall provide such other means to prevent damp rising within the building as shall be approved by the local authority.

E. *Lobby to Closets.*—Every person who shall erect a water-closet or earth-closet in connection with any building shall cause the same to be properly ventilated and lighted by a window in the side thereof, and he shall cause every closet which is not reached through the open air to be separated from any dwelling-room, bedroom, workroom, or shop by a sufficiently ventilated lobby.

F. *Privy.*—Every person who shall erect a privy or closet which is not provided with means of supplying it with dry earth or other deodoriser, and with appliances for the frequent removal of filth, shall cause same to be placed at a distance of fifteen feet at the least from any dwelling-house, factory, workshop, or public building, and from any highway or public footpath.

G. *Soil-pipes and Wastes.*—Every person who shall erect within a building a water-closet or any sink for the reception of liquid or solid filth shall connect the waste-pipe therefrom to an examination chamber or to a soil-pipe outside the building and provided with efficient through ventilation, and he shall also cause the waste from every bath, lavatory, and sink to pass into the open air before being discharged into any drain. He shall not allow the water from any rain-water pipe, nor the overflow from any rain-water tank or from any cistern, to discharge directly into any drain used for foul water.

H. *Disposal of Sewage.*—Every person who shall erect, or who is liable to maintain, any system of drainage, shall provide that the discharge from any drain, or the overflow from any cesspool, shall not enter any ditch or running stream in such a manner as to pollute the water therein; nor shall the sewage be so disposed of as to be a nuisance or detrimental to health.

I. *Party Wall.*—One other subject not included in the Model Rural By-laws of 1903, Mr. Bridge thought, should most certainly be added, and

be of universal application. The duty of not setting one's neighbour's property on fire ought to be recognised. The efficiency of the party wall for this purpose in small buildings, such as for the most part we have now in view, is manifest. The Royal Institute have submitted to the Local Government Board a carefully drawn clause on this subject; but it was neglected in the new model in favour, apparently, of provisions as to the sizes of windows and heights of stories which seem to assume that the proposed buildings are to be carried out by lunatics. It may be well to remind some of you that the Institute does not suggest that party walls should be carried through the roof in small buildings, while in warehouses it suggests increased height, as in the London Building Act. Considerations of comfort and decency, apart altogether from risk of fire, suggest that houses intended for occupation by different families should be efficiently separated.

When the local authority provides sewers for the use of its district a new stage is reached. Plans showing the drains needed must be submitted, and the works to be executed agreed to, as a condition precedent to having the use of the sewers. I am quite certain that the friction and unpleasantness which now arise in some cases, would be avoided if the local authority and their officers would co-operate with the architect in doing the best for the buildings under the special circumstances of each case, rather than regard their by-laws as the laws of the Medes and Persians, however useless or inapplicable they may be.

Mr. Stenning's and Mr. Menzies' papers at the Surveyors' Institution, and the discussion that followed, made suggestions that there should be uniform by-laws throughout the country and a tribunal of appeal. Mr. McMorran in the discussion suggested: (1) That the whole code of by-laws ought to be revised, and revised by experts; (2) that the power of making by-laws should be restricted to matters specially affecting localities; and (3) in so far as there was discretion to dispense with by-laws that might be applicable to local authorities, that discretion should be the subject of appeal to a competent and expert tribunal. He thought—in fact, he was almost sure—that in that meeting those propositions would meet with approval.

He thought the time had come when we ought to be out of the leading strings of by-laws, and that something like an attempt should be made to codify the rules governing matters affecting the comfort of the community, whether urban or rural, especially those relating to new streets and buildings.

Mr. William Henman, of Birmingham, who has taken a great interest in this question in a series of articles in the *British Architect*, suggests that the by-laws should be drawn so as to provide that certain things well ascertained to be detrimental to safety or health shall not be done. The principle on which building by-laws have been drawn up is wrong, because they generally dictate what is to be done before actual requirements have been ascertained. The proper principle would be first to decide what, in matters connected with building, is proved to be detrimental to safety and health, and then to define what shall not be done.

In support of this view he pointed out that the common law does not lay down that everyone shall do this or that for the public good; but when it has been determined that certain acts are prejudicial, the law requires that they shall not be done, or penalties will be incurred, leaving individuals to act in any other way. For instance, a by-law should not dictate that a wall must be a certain thickness, simply because it is a particular height or length, before the functions of that wall have been ascertained, but rather that a wall shall not be less in substance than can be proved by scientific means to be adequate for the functions it has to perform in a particular building. The latter, Mr. Henman thinks, is the correct principle on which all building by-laws ought to be framed, and no mere tinkering with the wording of existing by-laws will ever make them satisfactory or serviceable in the interests of communities.

The by-laws which have been approved by the Local Government Board may be roughly divided into three groups.

The Rural Model, Series IV., will allow any form of material or construction for walls above the damp course, and simply regulates the space around buildings, drainage, water-closets, and ash-pits.

The Intermediate By-laws, consisting of the urban by-laws, with some of the structure clauses modified as follows:—

3. Any building such as is hereinafter described shall be exempt from the operation of the by-laws numbered respectively * * * to * * *, both inclusive, that is to say:

Any building comprising not more than one story—

(*a*) Each wall of which, to a height of not less than six inches above the surface of the ground adjoining such wall, shall be constructed of good bricks, stone, or other hard and suitable materials at least nine inches thick, and properly bonded and solidly put together:—

(i.) With good mortar compounded of good lime and clean, sharp sand or other suitable material; or

.) With good cement; or

i.) With good cement mixed with clean, sharp sand; and provided ι proper damp-proof course of sheet-lead, asphalte, or slates, laid in .t or other durable material, impervious to moisture, beneath the of the lowest timbers, and at a height of not less than six inches the surface or the ground adjoining such wall; or (*b*) each wall ich shall be carried at a height of not less than six inches above the e of the ground adjoining such wall, upon sufficient piers con-ed of good bricks, stone, or other hard and suitable materials, rly bonded and put together, and having proper footings resting on olid ground, or on some other solid and sufficient foundation, and such pier having also a proper damp-proof course of sheet-lead, te, or slates laid in cement, or of other durable material impervious isture beneath the level of the lowest timbers of the building, and eight of not less than six inches above the surface of the ground ιing such wall.

.) The area covered by which shall not exceed in extent * * * * ε feet, or the capacity of which shall not exceed * * * * cubic and

.) The distance of which from the opposite side of the adjoining shall be not less than * * * * feet, and the distance of which the boundary of any adjoining lands or premises shall be not less * * * * feet.

ovided (i.) That where any building such as is hereinbefore described , or is intended to form, part of a block of new buildings which be intended for use as dwelling-houses, and shall not exceed two in er, the two buildings shall be separated by a party wall which shall, thstanding anything hereinafter contained, be constructed in lance with the requirements of the by-laws in that behalf.

.) That this by-law shall not be deemed to apply to any building forms, or is intended to form, part of a block of new buildings led for use as dwelling-houses and exceeding two in number.

his allows the walls of a detached cottage, or semi-detached cottage, of any material or construction above the damp course.

he 1903 Model By-laws contain modifications which allow cheaper ruction. The party wall height is measured to the base of the gable. is a relief in thickness required.

rovisos for the external wall upper stories of dwelling-house to be of r framing, tile-hung, etc.

The measurement of walls has been made clearer, so that a three-story building can be built with nine-inch walls.

Whether the principles of sound building should now be codified in a public statute, or the present arrangement of dealing with the matter by means of by-laws suited to the individual locality, need not seriously affect the question as to what can be stated as the minimum sanitary requirements which can be laid down to guide those framing the statute or by-laws; and the question is whether the standard set by the existing by-law is capable of modification with a view to legitimate saving of cost, or even, within proper bounds, reduced to meet the popular cry that the requirements are in advance of the public sentiment. It must always be borne in mind that too sweeping reforms stultify themselves by preventing improvements which a more moderate requisition might make feasible.

Mr. R. M. Chart, in the discussion at the Surveyors' Institute, gave the six points that could be dealt with in the public statute as follows:—

(1) The laying out and making and draining of new streets; (2) the sufficiency of space about buildings to secure a free circulation of air: (3) the provision of foundations and damp course, and the concreting of sites, and eaves and gutters necessary to secure the premises against damp; (4) provision for proper sanitary conveniences and drainage; (5) provision for sufficient windows and their being made to open; and for (6) a minimum height of living and sleeping rooms; and that special by-laws should be made with regard to other matters applicable to urban districts consisting of a specified density of population.

The only extra subjects to the Rural Model By-laws in this suggestion are the eaves, gutters, rules for windows, and height of living rooms. With regard to the height of living and sleeping rooms, I think that this should not be included in an Act. The fitness or otherwise of a room for habitation is a question of proper ventilation, which no rule of cubic capacity will insure, and the existing by-laws which lay down the height of rooms often result in foolish limitations for the sake of saving the face of the by-laws.

The question arises of timber frame houses for human habitation. They are said to be warmer, drier, and more healthy than nine-inch brick walls; on the other hand they are liable to get verminous.

The isolation exemptions offer the difficulty of future development breaking down the isolation, and what remedy is possible when the character of the neighbourhood changes? Again, many tenants make no use of garden ground except to cover it with rough sheds and litter which often create nuisances.

By-law that requires 100 sq. feet of paving to every new house e limited to where it is necessary for the prevention of unsanitary ns.

ve endeavoured in this paper to set out the points for discussion han to lay down any minimum rules. In my opinion the Rural By-laws meet all the requirements of the case, the public having er to return members to the district councils pledged to get the nable by-laws repealed and the rural model adopted.

, in conclusion, I venture to express the opinion that in the event rts being asked for further suggestions for this building code, The Sanitary Institute may be consulted in a matter in which it has ch excellent previous work.

ISOLATION HOSPITALS FROM THE POINT OF VIEW OF THE MEDICAL OFFICER OF HEALTH.

By D. S. DAVIES, M.D., D.P.H.,

Medical Officer of Health, Bristol.

Read at Sessional Meeting, Bristol, April 8th, 1905.

ALTHOUGH Bristol is the sixth largest town in England, it is not yet adequately provided with isolation hospital accommodation. This is not to be ascribed to the neglect of the Health Committee, for they have been placed, ever since their formation in 1897, in a peculiarly onerous position. Most, if not all of the large towns had, many years before that time, commenced to make provision of this sort, and over a series of years have completed their schemes up to at least the minimum of one bed per 1,000 population. The reason why Bristol lagged behind was that, through the complaisance of the Guardians, the onus of dealing with epidemic disease still rested upon them until 1894, when they revolted. Thereupon seventy-six permanent beds at Ham Green and a small establishment at Novers Hill, mostly temporary, arose by 1899; but meantime the city population had increased by over 100,000 persons, and thus the available beds, even with the addition of twenty-two beds (temporary) for diphtheria at Clift House, became quite inadequate, and in no way replaced the accommodation formerly afforded by the Guardians.

Towards supplying some of this deficiency the new block, which is to be inspected by the members, has been supplied as a substantial instalment.

Isolation Hospitals: the Theory and Practice of their Effective Use.

The temporary seclusion of a person suffering from a communicable fever which comes to a definite end in a short period (acute), should

succeed in preventing any further spread of the disease in question, provided the following "essential conditions" are fulfilled:—

1. The patient has not handed on his infection to any other person before his seclusion commenced.
2. The patient has left behind no infected material, or, if he has, such infected material is rendered sterile.
3. The patient is kept perfectly secluded, through the whole of his illness and convalescence, from direct or indirect communication of his disease to others.
4. The patient perfectly recovers before he is cleansed and discharged from seclusion.

Failure in any one of these essential conditions may wreck the preventive success of isolation, but this does not affect the value of isolation as a *principle.*

Let us consider some factors influencing the fulfilment or failure of the four essential conditions of isolation.

THE NATURAL HISTORY OF THE DISEASE IN QUESTION.

The spread of our common communicable fevers may be taken to be, with perhaps the exception of enteric fever, *immediately* personal. Disease spreading in this way from person to person tends to assume, if unchecked, a geometrical rate of increase, so that one case may, with a common ratio of three, give rise in five incubation periods to some 240 cases. This effect is most clearly seen, as is also the simple inhibiting effect of complete isolation, in a disease which between its periods of invasion disappears utterly from amongst a population. Upon its reintroduction as a single case it is thus often possible to watch the progress of epidemic growth from this one case, and to realise, in checking the first outgrowths, the real meaning of "preventive" medicine. Epidemics are never ready-made. Smallpox is a type of disease that notably gives us this opportunity, by reason of the life-habits of its causal parasitic organism. This is so highly organised that it is *selective* in regard to the soil on which it grows, and will neither grow on an unsuitable nor an exhausted soil. Also we can render the soil of contacts unsuitable by inducing vaccinia. If the soil is unsuitable the person exposed to infection neither *contracts* smallpox nor *carries* it; the infection simply dies out. Again, if the soil is suitable the disease runs its acute course; after which the soil becomes *exhausted,* and the disease cannot, and never does, persist in the patient. So we get no chronic cases and no "return" cases.

Hence we may say that a patient either definitely has or has not smallpox at any particular time; he never merely *carries* it on his living tissues in an inert, but to others a potentially infective, form.

Again, the disease, although one of high infectivity, is not so except to intimate contacts, for the first two days.

Owing to these points in its natural history smallpox is the most straightforward of diseases, and in general, when taken in hand upon its first introduction, all four of the essential conditions of isolation may be readily fulfilled. Hence hospital isolation is generally successful in this disease, and its methods and value can be usefully demonstrated.

I do not think I need labour this point, as the value of hospital isolation as *one* essential in dealing with the spread of smallpox is generally admitted.

Diphtheria is a disease whose natural history renders it much less straightforward than smallpox, although it resembles that disease in being spread from person to person.

The parasitic fungus of diphtheria appears, however, to be more lowly organised; it is certainly not selective as to its soil. Most or all soils prove suitable; it will grow in some form or other upon the mucous surfaces: palatal, nasal, aural, &c., or upon raw skin surfaces of, probably nine-tenths of all children under 12, and somewhat less freely upon older persons. Of these nine-tenths who receive the organism, retain and grow it (*i.e.*, become infected), only about half are susceptible to intoxication by the fungus (*i.e.*, suffer from clinical diphtheria); while the remainder *carry* it merely, showing no symptoms, or very slight symptoms themselves, but being potentially highly infectious to others.

Further, an exhausted soil forms no bar to further growth: the patient who has passed through the clinical disease recovers, but the fungus, though it can harm *him* no further may continue to flourish just the same, having perchance gained access to the recesses of the nasal cavity, to the antrum or to the frontal sinuses.

Hence we are confronted with an acute infectious disease, which may upon occasion, fortunately not often, become chronic and may persist for months or years. And again, we are confronted with a disease in regard to which a patient may present one of three conditions: he may be (1) suffering from it; (2) not suffering from it; (3) carrying it.

It is obvious that such a disease as diphtheria presents far more complicated problems to solve than does smallpox.

For example, when a case of clinical diphtheria is notified, we cannot be satisfied with mere removal of the obvious patient and the usual

disinfection. The patient may be only one of several home cases, the symptoms in the others having been masked or absent; and all home contacts need to be bacteriologically examined before we can satisfy condition (1) of success in isolation.

Isolation in diphtheria is most necessary for securing the full use of antitoxin, and for operative treatment of laryngeal cases. Judiciously used, removal of undoubted cases, together with home prophylactic treatment of suspicious cases has a marked effect, though a limited one, in checking the spread of this disease.

Scarlet fever is more akin to diphtheria than to smallpox in the difficulties it presents to successful isolation; but the tendency to chronicity is much less marked, and I think of less duration than in diphtheria. Scarlet fever is prone to assume extremely mild types, especially of late years, and these cases are readily "*missed*," and keep the infection going. Hospital isolation can obviously not deal with "*missed*" cases, and therefore fails to control a certain amount of the spread of the disease. The extreme mildness of scarlet fever nowadays has rendered the detection of cases increasingly difficult; the mildness of the epidemic form therefore is responsible very largely for increased spread of this disease of recent years.

THE AMOUNT OF HOSPITAL ACCOMMODATION NECESSARY, AND THE METHODS OF ITS USE. THE NEED FOR ANTICIPATORY PROVISION.

Possibly no more difficult point exists. The minimum isolation hospital provision for large towns is accepted at one bed per 1,000 of the population. The cubic space per bed should be at least 2,000 feet. How can this be allotted to the various diseases?

Smallpox.—The amount needed depends intimately upon the district, its exposure to introductions, and upon the personal element and experience used in the medical control of introductions. For example, our reserve beds for a possible smallpox introduction are twelve only, and we have thirty-five beds, without overcrowding, for smallpox altogether; this is, of course, not enough; the reserve alone at Newcastle-on-Tyne amounts to 100 beds. But the penalty of ten years' unbroken success in dealing with introductions in Bristol has to be paid, although the city, in 1897 and last year, was increased by a greater number of persons than the whole city of Birkenhead or of Southampton. Well—*nous verrons!*—it is possible that a variant of the fable of the Shepherd and the Wolf might occur, wherein the shepherd warded off real wolves, with what help he had, until a day came when the wolves prevailed.

Provision should be anticipatory.

Beds are often most useful when generally empty.

These are the most difficult points for the lay mind to grasp, and yet they lie at the root of efficiency. The twelve vacant beds have done yeoman service with introductions of smallpox, which, for example, came in during six months of 1903 at an average of one case every fortnight.

If these twelve beds had not been waiting, in a very few weeks 100 beds would not have sufficed, for epidemics spring from single cases.

With scarlet fever we are never, in a large city, in the same position of vantage as with smallpox. It is endemic, never absent for a single day, characterised only by periodical, so-called epidemic exacerbations and remissions, and by occasional outbreaks due to school influence or to some other special cause, such as the chance infection of a milk supply.

Is the attempt at isolation of any use in controlling the spread of this disease?

This is a question frequently asked, and attempts have been made to answer it in many ways, notably, (*a*) by appeal to comparative statistics of different districts, and (*b*) by appeal to comparative statistics of the same district at different periods.

(*a*) This method is fallacious for many reasons. Districts approach isolation from different standpoints: in one district cases will be moved indiscriminately as they apply; in another district careful selection will be made, and only those cases that cannot be properly isolated at home will be moved to hospital.

For the indiscriminate method an excess of accommodation is needed, as in Liverpool, where there are, I believe, 1,200 beds available for 700,000 population. This system seems to me to aim at relief rather than isolation, and to save trouble to many parents who are perfectly well able to carry out isolation themselves. Towns with more modest accommodation, not exceeding one bed per 1,000 of the population, must needs discriminate their cases or the hospitals will become full very soon on an epidemic wave, and a full isolation hospital is a sign of failure. The constitution of the population of different towns varies also as to age distribution, occupation, school habits, exposure to imported infection; and further, for any useful comparison, two periods should be chosen presenting the same period of attack by epidemic waves of similar intensity, and by a strain of disease of similar kind.

(*b*) Nor do comparative statistics of the same district at different periods always prove conclusive, for we must accept the fact that the

strain of disease introduced in different epidemics varies enormously, and we cannot confidently predict from the action of a certain disease in one epidemic its action in the next. From our own experience in Bristol I am unable to draw any conclusions, partly because we have never yet had sufficient hospital accommodation to isolate all the cases that needed it, and partly because the enormous growth of the city in 1897 added a new population of some 100,000 persons to the city, and so rendered comparison with previous conditions impossible. It is true that in 1899 the first instalment of fever beds was opened at Ham Green, but this amounted to seventy-six beds (or one hundred with crowding), and was inadequate to the minimum needs even of the old city.

Since notification commenced in 1890, three epidemic periods of scarlet fever have occurred; two are comparable, viz., the 1892–3, and the 1896 epidemic—the latter showing a lower prevalence figure and shorter duration. The next epidemic wave, however, involved the extended city, and so is not in any way comparable; it has shown high prevalence figures over a long period, but quite low mortality. And this low mortality is of course due to the mild strain of disease, with a fatality not exceeding 2·4 per cent. in any one year: true, but so also is the wide prevalence due to the mild strain of disease. This is a point that is generally neglected, but most health officers will agree with me that if every single case in an epidemic of any disease was always well marked and clinically serious, it would be a good thing for the community. Recognition would be easy, isolation could be made effectual, and the disease would be readily controlled. "Missed" cases are amongst the most effectual promoting causes of an epidemic, and mild outbreaks are therefore by far the most difficult to meet, and the most dangerous to the community; in addition, they serve to veil the undoubted utility of isolation hospitals.

The answer to the question, How much hospital accommodation is needed? may vary considerably with the type of disease.

For example, I have now had nineteen years' experience in this city; for the first thirteen years I neither had, nor felt the want of, beds for cases of diphtheria, which was not very fatal (the mortality varying from a half to a quarter that for England and Wales), never caused school outbreaks, and showed little tendency to spread, or to linger in "carrier" cases. Suddenly in February, 1900, all this was changed. Bedminster, a southern district of the city, was invaded, apparently from the county, by a virulent form of bacillus, which attracted our attention in the laboratory as morphologically distinct from the forms we were accustomed to.

In epidemic virulence and fatality it corresponded, and for the past

five years we have shared the fate of many towns in an unequal contest with this most insidious and difficult form of diphtheria, which is fatal, causes school outbreaks, and affects whole families in throat, or nose, or ears; it also produces severe, or moderately mild, and "carrier" cases amongst groups of contacts, and is persistent and sometimes distinctly chronic. For this we have needed sometimes as many as eighty beds; and its prevalence has still further lessened the amount of scarlet fever accommodation available. The added districts have proved by far the most susceptible to diphtheria, for some two years they furnished the bulk of the cases. The whole course of the outbreak has tended to confirm my belief that the spread of diphtheria is a purely personal matter, and that in an ordinarily well-looked after town at any rate insanitary conditions are inoperative. The diphtheria bacillus is much too delicate an organism to live in drains or on filth heaps; and the sum of the effect that even a rampant insanitary condition can reach would be, I suspect, to produce a somewhat susceptible mucous surface for the implantation of the specific fungus received from another person. Insanitary conditions are unlovely, and must be amended; but I do not know that they bear any causal relationship to the ordinary communicable fevers of this country, with the exception, of course, of the intestinal disease, typhoid fever.

[*For Discussion on this Paper, see page 260.*]

A SHORT DESCRIPTION OF THE ISOLATION HOSPITALS PROVIDED BY THE CORPORATION OF BRISTOL.

By T. H. YABBICOM, M.Inst.C.E.,
City Engineer.
(FELLOW.)

Read at Sessional Meeting, Bristol, April 8th, 1905.

FOR comparison it may be useful to state that the area of the City of Bristol is 17,004 acres, and the population over 358,000.

Hospitals for the treatment of infectious diseases have been established two sites in consequence of the decision of the Local Government ɔard not to allow any other disease to be treated on the same site with ıallpox. It is sometimes very difficult for a local authority to obtain a ııtable area of land for the treatment of smallpox within a reasonable stance of the population where its presence may most likely be anifested. The greatest length of the city from north-west to southst is about nine and a half miles, and its breadth from south-west to rth-east nearly seven miles. The densest populations are situated in centre, east and south, the residential neighbourhoods being distributed r the west and north, while the extreme north-west is occupied by the onmouth Docks and a population almost exclusively occupied thereut. It was therefore fortunate that the Corporation was able, a few rs ago, to secure land, thirteen acres in extent, at that time without, now, through an extension of the city boundaries, just within the isdiction of Bristol.

NOVERS HOSPITAL.

This area is on the extreme south of the city, about two and a quarter es from the Council House, on the top of Novers Hill, over 200 feet ve Ordnance Datum. Very few cottages have been built within the

quarter-mile radius of the hospital, and there does not at present appear to be any desire to extend the city in that direction.

The administration building has been substantially built of brick with Bath stone dressings, for the accommodation of a resident medical officer, a matron, and twelve bed-rooms for nurses and servants, with dining and recreation-rooms. An observation block of brick, having four two-bed wards and two nurses' duty-rooms, has been built in such a manner that the patients and nurses in one half of the building can hold no communication with those in the other half, the w.c., slop closet, and bath being detached from the main building, and having access therefrom by a covered verandah. Each of these two-bed wards is 24 feet by 18 feet by 13 feet high.

The laundry contains the necessary machinery for disinfecting and washing for 100 patients, and is built of brick, as is also a porter's lodge.

The ward pavilions were constructed of wood in a few weeks during the smallpox epidemic of the spring of 1904, and were intended for temporary purposes only. They are still there, and likely so to be. Although they are not such as is to be desired, still they provide something like fifty-three beds.

Ham Green Hospital.

By the foresight of an alderman of the Corporation and former Mayor, Sir G. W. Edwards, a beautiful estate of ninety-nine acres, known as Ham Green, on which stood a residential mansion, two farms, and several cottages, bordering the River Avon, at a distance of four miles from the centre of the city, on a height eighty to ninety feet above high water, was secured for £8,695, and resold to the Corporation for the same price. Out of this estate, thirty-eight acres with the mansion have been assigned for hospital purposes.

The geological formation is Dolomitic Conglomerate, and borings to a depth of ninety feet have failed to find water in any quantity. It was therefore necessary to make arrangements with the Portishead water company for a supply; and to insure a constant service a tank capable of containing 30,000 gallons has been placed forty-five feet above the level o the site on a light iron structure. This tank also provides a head of wate for the use, if necessary, of the fire appliances, which are freely distribute over all the buildings.

It was decided to alter and extend the mansion so that it could b used as the administration building, a natural suggestion to the lay min but one entailing great trouble to the professional advisers of the Corpora

on, and expense. Such adaptations are seldom very satisfactory, and it as soon found necessary to increase the accommodation by building a ew annex containing four dormitories for servants, thirteen bed-rooms for urses, with work-room, store-room, and other offices.

The medical officer is accommodated in the oldest portion of the house, apable of complete isolation, with a sitting-room, study, dispensary, two edrooms, bath-room, etc.

The matron's rooms, nurses' dining hall, and recreation-room are on he ground floor of the newer part of the mansion, the bed-rooms being n the first and second floors and in the new annex. The billiard-room as been converted into a committee-room.

At the entrance to the site is the porter's lodge, a brick and half-imbered structure.

Immediately beyond the lodge is placed the building for the laundry nd for the generation of electricity. Two Cornish boilers, each twenty eet by five feet, supply the motive power throughout the establishment. The electric light plant consists of two dynamos capable of running 640 ixteen-candle power incandescent lamps. There is also a storage battery rovided, to allow of the dynamos ceasing work at night, and capable of lischarging a supply equal to eighty sixteen-candle power lamps for ten ours. The length of this paper will not allow of a detailed description f the laundry and its disinfecting plant, but the machinery is of the latest types.

The stables have accommodation for eight horses, a van house, and living rooms over.

The hospital buildings now consist of seven blocks substantially built in late Gothic style, in red brick with freestone dressings. The roofs are covered with layers of boards, felt, and slates.

One observation block has been built of the same dimensions as that lescribed at the Novers Hill site, and a second has been added recently f a slightly different design, the four beds of each half being distributed three rooms instead of in two as in the earlier design, providing for t more absolute isolation. Each half of the structure is effectually vided from and has no connection with the other, and the sections may used for males and females respectively. The two-bed wards are feet by 13 feet, and the single-bed wards 13 feet by 12 feet, the rses' duty-rooms being 15 feet by 13 feet; all these chambers are feet high. It is unnecessary to say that the cost of these buildings is ry great for the eight beds accommodated, but they are invaluable from e medical officer's point of view.

Four ward pavilions have been built with all the rooms on the ground-floor, the buildings being spaced 60 feet apart; each consists of an entrance hall, a nurse's duty-room, a single-bed ward and bath-room, grouped in the centre, with pavilions on each side 48 feet by 26 feet, to accommodate eight beds in each, with a cubic space of 2,184 feet for each patient.

The brick walls are double, each nine inches thick, with a three-inch air space between. The whole site was covered with six inches of concrete. The interior walls and ceilings are plastered with Keene's cement and painted. The floors are of wax-polished pitch pine blocks.

The w.c.'s and slop closets are placed at the ends of the pavilions, being cut off from the latter by an air passage.

Much attention has been paid to the warming and ventilation of the wards. The window surface measures about 250 superficial feet per ward, the windows having a deep bottom rail to allow of ventilation at the centre rail.

The ceiling of the first four pavilions built is fourteen feet from the floor level, but in the latest structure this was reduced to thirteen feet by consent of the Local Government Board. Movement in the upper strata of air is insured by the top portions of the windows being made to fall inwards and by two ventilating shafts in the ceiling of each ward. Fresh air is introduced under each bed, the amount being controlled by hit-and-miss gratings. Warmed air is also introduced into the wards by a pair of Shorlands ventilating open fire grates placed back to back in the centre of the ward. As the ordinary flue pipe would be very unsightly and an obstruction, the flues are carried in channels underneath the floor and answer perfectly well. A small kitchen range has been put in the nurses' duty-room to keep food warm, etc., cooked in the administration kitchen, and a separate boiler provides for the hot water circulated for the baths and lavatories.

All the drains are outside the buildings, and the end of every length of drain is ventilated. The drains of each pavilion are disconnected from all the rest, and an automatic flushing tank of 200 gallons capacity insures the pipes being periodically cleansed. White glazed bricks have been freely used as a lining to all bath-rooms, water-closets, slop-closets, etc.

The latest addition to the hospital accommodation has been a new pavilion, in which the principle of having all the rooms on the ground floor has been departed from, and wards, etc., are constructed on both ground and first floors. It is evident that such a structure must be more

economical in proportion to the number of beds accommodated than the usual one, a saving being effected in foundations and roofs, and no greater thickness of external walls being necessary. It was not, however, without much consideration, many plans and interviews, that the architectural adviser of the Local Government Board agreed to the innovation.

In general design the new block follows the earlier ones, which are somewhat dwarfed in appearance by the greater dimensions of their neighbour.

Opening out of the central hall are two wards, each 72 feet long by 26 feet wide, to take twelve beds, each bed having a cubic space of 2,028 feet. On the first floor are two similar wards. A wide staircase leads to these, which are completely isolated from those below. A small one-bed ward is provided on the ground floor and a two-bed ward on the first floor, otherwise all the arrangements previously described are duplicated.

The floors are constructed of cement concrete, carried on rolled steel joints.

The Shorlands stoves, of which there are two pairs in each ward, are supplemented by low-pressure hot water radiators.

A lift has been put in to raise coal, dinners, etc., to the first floor, but it is not used for the conveyance of patients.

The number of beds for patients now provided in all the buildings are as follows:—

Four pavilions of 17 each	68
One pavilion of 51	51
Two observation pavilions of 8 each	16
Total	135

Separate systems of sewerage have been provided, the water from the roofs and roads being carried direct into the River Avon, while the sewage proper is conveyed by pipe sewers a distance of 266 yards from the buildings to precipitation tanks of the Dortmund type, where the sewage is chemically treated before the effluent is discharged into the river, the small amount of sludge being dug into the soil of the adjoining field.

Unfortunately, all that medical skill and careful nursing can do will not always end in recovery, and a mortuary has been provided where the body can be seen for the last time by friends, without the risk of infection, from a small room provided with a glass window.

When a patient is sufficiently recovered to be restored to his friends as a final precaution he is passed through the discharging block, where he

leaves his hospital garments in one apartment, has a bath in an intermediate one, and is attired ready for his re-entry into the outer world in a third.

[*This Discussion applies also to the Paper by* DR. D. S. DAVIES.]

THE LORD MAYOR OF BRISTOL, in offering the members a cordial welcome, said he did so the more heartily because he believed that the Institute was a most useful and beneficial agency in promoting the health and well-being of the people. Some thirty years ago, about the time of the foundation of the Institute, sanitation was in its infancy, and its value hardly recognised. The statement of one of their founders, Sir Henry Burdett, seemed almost incredible, that so short a time ago as 1876 the majority of hospitals had no plans of their drains, and that the mortality in the best hospitals after serious surgical operations was 37·8 per cent., and not only were the houses of the poor improperly drained, but many of the Government offices, and even Royal Palaces. Now all this was changed, thanks in some degree to the influence brought to bear on public opinion by their Institute. The Public Health Act and other legislative enactments had resulted in the reduction of mortality, the lengthening of life, and improvement in the physique of the nation. The mortality in regard to surgical operations in serious cases, alluded to by Sir Henry Burdett, had fallen from 37·8 to 2 per cent., while the number of these operations had increased a hundredfold. In visiting Bristol they were coming to a city with a long historic record and one of great antiquity. Of Bristol, at the end of the Stuart period, Macaulay wrote:—"A few churches of eminent beauty rose out of the labyrinth of narrow lanes built upon vaults of no great solidity. If a coach or cart entered these alleys there was danger that it would be wedged between the houses, and danger also that it would break in the cellars." All this, he was glad to say, had been changed, and, although they had to sacrifice some of the picturesqueness of their city, their broad thoroughfares and open spaces compared favourably with any other ancient city that had had to be transformed and adapted to modern requirements; and thanks to their excellent Sanitary Committee, under the able guidance of its chairman, Alderman Cope-Proctor, he thought that they could claim that Bristol was one of the best-kept cities in the kingdom. Under the care of their Medical Officer of Health, Dr. Davies, their death-rate was one of the lowest in the country, and he might refer with satisfaction to their beautiful suburb of Clifton. In the Registrar General's public returns, its death-rate had often been quoted as low as 5 per 1,000. This, they might remember, was the rate which Dr. Richardson, the first president of the Institute, imagined might

be possible in his ideal city. He was glad that their medical officer, Dr. Davies, had been honoured by an invitation to open the discussion that morning, by introducing the medical aspect of sanitation, and that Col. Yabbicom, their City Engineer, had been asked to follow by a paper on the construction of hospitals. It was satisfactory to know that under the guidance of Dr. Colston Wintle they were to visit the city isolation hospital at Ham Green, not only because they thought it well worthy of inspection, but also that they would get a glimpse, at least, of some of their surroundings, of which they, as citizens, thought the members would say they might be justly proud.

Dr. Colston Wintle (chairman of the Bristol Health Committee) remarked that there was a disease, to which allusion had not been made, which killed more people perhaps than any other complaint. They lost in Bristol annually from consumption four hundred lives, and in Birmingham there were a thousand deaths yearly from it. He then explained the co-operation of the Corporation in the Winsley scheme, where the twenty city patients were all doing fairly well. It seemed curious, he added, that they had a disease killing hundreds of people yearly, and no move had been definitely made in this direction before. It might be they had lacked knowledge, and that it was only just now they were beginning to appreciate the fact that this disease must be cured and prevented. He had received statistics, sent him from a sanatorium that had been at work for four years. Of the bad cases, forty per cent. had returned fit for work; of the cases in the second class, seventy-four per cent.; and in the slight cases, over ninety-five per cent. were cured and returned to work. In providing a sanatorium they were also educating people as to the way the disease was spread, and he trusted that they would be able in time to come to prevent the large mortality this complaint inflicted.

Dr. Herbert Jones (Herefordshire) commented upon the advances which had been made during recent years in preventive medicine and in our knowledge of the causes of disease, as shown by the fact that Dr. Colston Wintle introduced with perfect propriety the question of the treatment of consumption in a discussion upon isolation hospitals. He considered that Dr. Davies had given them the clearest arguments in favour of treating infectious disease by isolation in hospital. The question was just now a very vexed one, and could not be settled by mere statistics. It was impossible to compare one town with itself, much less with another. They must look at the question in a common-sense way, and ask themselves what happened if a case of infectious disease occurred in a moderately large house. The patient was at once removed to a separate room, and was isolated from the rest of the household. Well, the isolation hospital was the working man's spare room. When discussing the question of the cost of isolation hospitals he regretted that neither the Local Government Board,

nor architects, rendered them much assistance in solving the problem of reduced initial cost. He gave instances in which lack of care on the part of the latter would increase the capital outlay unnecessarily. For example, the putting in of tiled hearths or grates of such a size that special curb fenders would have to be made, the planning of windows for which blinds would have to be cut to waste, and the fixing of the size of rooms or passages which could only be fitted with linoleum or other covering with considerable waste. He spoke strongly of the necessity for taking into consideration, when planning a new hospital, the saving of the cost of administration.

DR. J. HOWARD-JONES (Newport) wished to draw their attention to the advantages of hospital treatment for membranous croup or laryngeal diphtheria. This disease, when treated in the old-fashioned way, was fatal in 66 to 75 per cent. of the cases, but under proper treatment the percentage should be under 10: even when those cases were included which did not come under treatment until the disease was well established. He felt confident that most medical officers of health present would agree with him that a considerable number of notifications of membranous croup arrived after the death of the patient. This was not as it should be, and showed a lack of the appreciation of the benefits to be derived from the modern treatment of the disease when energetically carried out. In order to illustrate this point he quoted the statistics for Newport for the last nine years. The total number of cases notified during that period was 87, with 50 deaths (a case-mortality of 57 per cent.) Sixty-six of these cases were treated at home, with 46 deaths (a percentage-fatality of 70). Twenty-one cases were removed to hospital, of whom four died (a case-fatality of 19 per cent.) Two of the four deaths occurred just after admission, and the other two cases were of long standing, one complicated with septicæmia, and the other with broncho-pneumonia and septicæmia. Nine of the hospital cases required the operation of tracheotomy. From these facts it was evident that the hospital cases were not less serious than those treated at home. As the successful hospital treatment of membranous croup depended partly upon the treatment previous to admission to hospital, he desired to refer to the question of treatment more fully than strictly came under the title of this discussion. The essential points in the treatment were:—(1) early recognition of the disease; (2) early injection of antitoxin in sufficient doses; (3) early notification by messenger or telephone in order to insure (4) prompt removal to hospital; (5) hospital treatment. The first point was entirely in the hands of parents and the medical attendant. The early injection of antitoxin was also in the hands of the medical attendant. It must, however, be borne in mind that the great majority of the cases of membranous croup occur among the poorer classes, consequently medical men could ill afford to give the antitoxin necessary for the successful treatment of the cases. It was the duty of sanitary authorities to try

to reduce the death-rates from preventable diseases. They could assist in doing this by supplying antitoxin gratis to medical men when patients could not afford it, and for use in preventing the extension of diphtheria by the inoculation of those who have been in contact with cases. An important detail in the process of removal of cases to hospital was the necessity of providing a cylinder of oxygen for use in the ambulance, and of sending a nurse in charge who was experienced in its administration, in order to tide the patient over possible paroxysms of partial suffocation during removal. On admission patients should be placed in tent beds treated with steam. (At Newport the steam kettle is heated by electricity, which is much safer than methylated spirits.) Adequate doses of antitoxin should be given immediately, say 8,000 to 12,000 units, repeated in a few hours if the disease was well established. He thought it well to supplement this by an emetic and small, but frequent, doses of strychnine and digitalis. If the symptoms of want of circulation of air in the lungs became acute, and the heart showed signs of failure, tracheotomy was performed without delay. The results that they had at Newport were most encouraging, besides having the satisfaction of seeing the patient relieved rapidly of the most painful symptoms of partial suffocation. Of the nine cases of tracheotomy for membranous croup, seven recovered and two died: neither of the latter had been treated with antitoxin previous to admission. In these cases the operation was performed more with the object of making death less terrible than with the hope of saving life, for one died soon after admission, and the other had broncho-pneumonia in addition. None of the cases which had been treated by early doses of antitoxin died. The points which he wished to lay special stress upon in refernece to isolation hospitals and membranous croup were (1) the importance of early injections of antitoxin, *i.e.*, previous to removal to hospital (here the duty of the medical attendant was evident): (2) the importance of performing the operation of tracheotomy when indicated, particularly if large doses of antitoxin have been previously administered; (3) the great reduction in the fatality of laryngeal diphtheria when treated upon the above lines, combined with early removal to hospital.

DR. J. MIDDLETON MARTIN (Gloucestershire C. C.), after expressing his appreciation of the valuable paper on isolation hospitals by Dr. Davies, referred to the principles of isolation laid down by Dr. Davies, and more particularly to the first of these: "that the patient had not handed on his infection to any other person before his seclusion commenced." Attempts had been made to show that hospital isolation was ineffective on statistics of the percentage of cases isolated in different towns for the same periods, and for different periods in the same towns. The conclusions, in his opinion, were entirely fallacious, in that it could not be certain that the first of Dr. Davies' principles was strictly complied with. In urban districts, from the mass of material to be dealt

with, it is much more difficult to comply with this condition than in rural districts, where one could follow up the cases more closely. From the speaker's experience in rural districts he was convinced that mild unrecognised cases were the chief cause of any apparent failure in hospital isolation, and no system of dealing with infectious disease was complete which did not provide for a strict search for unrecognised cases. With regard to the cost of isolation hospitals, it appeared to him extraordinary that there should be such a wide variation as from £160 to £500 per bed in different cases. Some of this difference was doubtless due to unavoidable causes, but possibly the average cost might be greatly reduced by a closer co-operation of the designers of these buildings. Smaller districts in some cases appeared to consider the cost of constructing isolation hospitals of the substantial character required by the Local Government Board prohibitive, and he thought that it might tend to the more general establishment of these necessary buildings if, in certain cases, buildings of a more temporary character were allowed on inquiries by, and representations from, the county councils as a first sanctioning authority. An important item in the expense of establishing isolation hospitals was the special and necessary requirements of the Local Government Board with respect to the position of smallpox hospitals. By these a distinct site remote from buildings is required for the reception of smallpox cases; at any time it is difficult for a local authority to obtain a site for an isolation hospital, but the extra requirements for a smallpox hospital make the provision of the latter a still more difficult and expensive matter. All this extra expense might be saved to this country if revaccination at school age, and at other suitable times, were enforced in this country as in Germany. Those who have seen Dr. Bruce Low's valuable report to the Local Government Board on this subject will remember that he was unable to see any cases in that country, as none existed at the time of his visit, and that when cases of smallpox were introduced they were isolated, not in special hospitals, but in a ward of a general hospital for infectious diseases. Thus Germany was saved the expense of providing special hospitals for smallpox, and the same might be done in this country.

Mr. R. Read (Gloucester) agreed with Mr. Yabbicom in his objection, as a general rule, to alter existing buildings for special purposes such as a hospital. He noted in the description of the buildings at Bristol that the hospitals depended for their water supply on a tank, holding 30,000 gallons of water, raised above the level of the site, and he thought that for fire purposes it would be advisable to supplement this by some chemical hand fire extinguishers distributed about the buildings, which would be a very useful auxiliary to the ordinary fire appliances, as there was always a time at the commencement of a fire when a bucket of water or a small chemical hand apparatus would put it out. Mr. Yabbicom appeared to have given great attention to the warming and venti-

lation of the hospitals, and, as these two things depended entirely upon one another, he was glad to see that Mr. Yabbicom had adopted the Manchester stove, to which air was admitted at the back of the fire, and after being heated was delivered into the ward at a point eight feet above the floor. As a rule, with heating arrangements by open fires for domestic buildings or hospitals, no provision was made for supplying the fire with air. The fire had to draw air from wherever it could, and it usually did so from the cracks of the doors and windows, and thus set up draughts. The only objection to the Manchester stove was that it was rather more costly than the ordinary stove and required the construction of a special flue. With ordinary stoves this difficulty of air supply could be got over by bringing the air from the outside of the building under the floor, and discharging it within one yard from the fireplace, a few inches above the floor level, in such a position that the most careless servant could not fill the tube with ashes. He also noted that it was considered necessary to keep eight horses in the stables to provide for the ambulance work, and it had occurred to him that as these were not always in use, but have to be fed, it might be cheaper to adopt a motor-van for the purpose of fetching and returning patients.

DR. J. TUBB-THOMAS (Wilts C.C.) pointed out that if a rich and ancient city like Bristol had not yet been provided with sufficient isolation hospital accommodation, one could hardly expect the smaller urban authorities, rural districts, and poor agricultural counties to be more advanced. The county which he had the honour to serve might justly claim to be on a level, if not in advance of Bristol, as it had at least two thirds of its population amply provided with isolation hospital accommodation, either completed and in use, or approaching completion. The question of the expense of providing isolation hospitals was a very serious one, especially in a county like Wiltshire, where one third of the cost of land, buildings, and furnishing of hospitals was provided from the county funds, besides a contribution of one third of the annual cost of establishment expenses. A communication had been received from the County Councils' Association saying there appeared to be a general feeling that the requirements of the Local Government Board and of the Lunacy Commissioners with regard to isolation hospitals rendered the cost of their erection unnecessarily high, and with a view of taking steps to make it possible to erect such hospitals at a less cost, the opinion of the County Councils and their officers was requested, as in what respects the requirements of the Local Government Board and the Lunacy Commissioners needed modification for this purpose, and he was preparing a report for his Council upon this subject. There could be no doubt that the feeling did exist. He feared it was largely caused by hospitals for the smaller districts being designed upon the lines of the magnificent and expensive buildings erected by the rich Hospital Boards and wealthy Corporations. He had no

doubt, and it had been proved in his own county, that really good, useful, and efficient isolation hospitals could be constructed at a moderate cost, under £300 per bed. The result was obtained by employing an architect who knew his work, and planned his buildings with strict economy as regards arrangement and construction on simple utilitarian lines, depending for effect upon good proportion and grouping: the materials used being such as were not only suitable but obtainable at reasonable cost in the neighbourhood. There could be no doubt that hospitals constructed on the basis of one bed per 1,000 of the population were practically useless in times of epidemic, and they should be largely used for dealing with first cases, and the prevention of epidemics rather than as fever hospitals in the strict sense of the term. He agreed with Dr. Herbert Jones' definition of an isolation hospital as the "poor man's spare room." He agreed with Dr. Davies' figures with regard to the prevention of smallpox during the last ten years in his district, and thought that the figures would equally apply to scarlet fever and other infectious diseases, if the local authorities were more alive and medical practitioners were more exact in their diagnosis, and the early isolation of first cases insisted upon. He had an excellent object-lesson in this direction whilst acting as medical officer of health of a large seaside health resort, largely used for children where the success of a season depended upon the absence of epidemic disease. Medical men, keen to their own interests and those of the town, were smart in detecting first cases, and the authority backed them up by instant removal, with the result that they never had an epidemic during the season, although the introduction of scarlet fever, etc., was of constant occurrence. One of the difficulties in rural districts and small urban districts lay in the fact that very few of the smaller hospitals were properly staffed, so many depending upon the unskilled caretaker in residence, and the sending for nurses to various institutions when cases required treatment. Authorities in consequence were very loath to open their hospitals for first cases on account of cost; the natural result was that the hospital was not opened in time, epidemics resulted, and isolation hospitals were held up to contempt as useless, and this solely because their primary object, to deal with first cases, had been forgotten. His experience of temporary hospitals, of wood or corrugated iron, had been very unsatisfactory, and he would want very strong reasons to induce him to advise their adoption, as the only provision of isolation accommodation: they have their uses as an extra provision in epidemic times.

Dr. James Fletcher (Resident Medical Officer, Ham Green Hospital, Bristol) discussed the fourth essential condition of successful isolation in Dr. Davies' paper, and in referring to the occurrence of return cases said that, though the general public thought otherwise, in only a few of the infectious diseases was there any hall-mark of freedom from infection. He advocated strict segregation of scarlet fever patients and antiseptic treatment of nose and throat throughout

the illness, pointing out that no better result could be expected till the specific germ was discovered: in diphtheria, large doses of antitoxin as early as possible along with local antiseptic measures and the absence of cachexia, as well as a negative bacteriological examination, should be insisted on before discharge. He was of opinion that return cases were more likely to follow the discharge of mild cases of both diphtheria and scarlet fever than severe ones, inasmuch as little reaction in the patient was produced and the micro-organisms often persisted for long periods. The results of home treatment of cases of fever were often well seen in patients admitted to hospital late in the disease, *e.g.*, untreated and often unrecognised otorrhœa, mastoid abscess, nephritis, diphtheritic paralysis, etc., and considering that the knowledge of the public regarding the nature of infection, asepsis, and the use of antiseptics was so very meagre, he was convinced that it would be a long time before home treatment could in any way compete with that in hospital.

DR. J. C. HEAVEN (Keynsham) emphasised the value of hospitals in rural districts, and pointed out that their usefulness in such districts could be more readily demonstrated than in large towns. He questioned whether the proportion of one bed per 1,000 of a small population was sufficient, as a small provision on this basis might easily be insufficient to meet a sudden outbreak; in fact, this had occurred in his experience. In small districts a certain minimum provision, say 20 beds, should be adopted; in districts with large populations the standard of 1 per 1,000 appeared to suffice. He questioned the easy working of joint hospital boards, and agreed that missed cases were undoubtedly fertile sources of the spread of disease.

TINNED OR CANNED FOODS.

Lecture delivered on April 17th, 1905,

By Prof. H. R. KENWOOD, M.B., D.P.H., F.C.S.,

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(FELLOW.)

I HAVE been asked to speak to you upon the subject of "Tinned and Potted Foods," a subject which, as you are aware, is a very important one. The canned-food trade is enormous, and the interests involved are most important, not only in regard to the extent of the business done, but also because of the great boon conferred on the working classes by the provision of cheap foods.

The object of tinning or canning is to preserve a large amount of food that would otherwise be wasted, and therefore it cheapens the cost of living. It is a means of preserving the superabundance of one good year to meet the needs of years of deficiency, while it also enables the products of one country to be sent to other countries where they do not exist naturally or are scarce. These tinned foods are extensively used in the colonies and in the army and navy, and for the purpose of expeditions into the interior of countries where food is difficult to procure. The variety of foods preserved in this way is very great indeed. The list, which I have collected from one of the large tinning firms of this country, includes the following articles, amongst many others: savoury pastes, sausages, grouse, pheasant, cheese, puddings, soups, ginger, beetroot, mincemeat, peas, celery, turnip, onions, fruits, and fish.

These preserved foods never, of course, have the flavour of the fresh article, because all of them are either completely cooked or must of necessity be partially cooked in the process of preserving them by tinning. But they have been shown to be far superior to salted food; and that has been the experience of the two last Arctic expeditions. The men do better and keep far freer from conditions allied to scurvy, or from

scurvy itself, when preserved food is consumed in preference to salted material. But there is good testimony to the fact that it is a mistake to attempt to maintain men for long periods on nothing but tinned articles. They can be used extensively and with great benefit when mixed with a certain amount of fresh material; but if men are to be kept in health, it is highly necessary that a certain amount of fresh food, in the form of vegetables or meat, should be mixed with the tinned provisions.

Now, there are certain dangers—and I take it these are more especially what I have to speak to you about this afternoon—there are certain dangers, I say, attendant upon the use of these tinned articles of food. Those dangers may be classified under four headings, and we will briefly consider the main facts under each:—

1. From changes in the food itself.
2. From the use of antiseptics.
3. From the use of colouring agents, and
4. From impurities yielded by the tins.

With reference to the changes in the food itself, these dangers admit again of classification under two sub-headings:—

(*a*) Changes due to the development of certain poisons, which have been termed "ptomaines" or "toxins"; and

(*b*) Definite putrefactive changes.

Now, the changes which are responsible for the production of toxins are not definite putrefactive changes. They may occur in articles which have been preserved, and which give no evidence whatever to the senses of smell or taste of even the commencement of putrefaction, and they often occur without any apparent reason whatever. Tinned sardines, for instance, may give rise to very serious and may-be fatal consequences amongst those who consume them, and yet there may be no "blowing" of the tin, no unpleasant taste, and no ill odour. The evil effects of these toxins, comprised under the first subheading (*a*), set in within forty-eight hours of the consumption of the article. The individual has pain in the region of the stomach, he vomits, has diarrhœa, and becomes more or less collapsed—that is to say, the pulse becomes very small, the extremities are cold, and very often there is a moist perspiration upon the skin. Death sometimes follows. Now, that condition of food is one which requires further elucidation. It is practically impossible for us to predict it by an examination with the naked eye of any article of food submitted to us; but it affects more particularly sausages, sardines, minced meat, and fish. The development of ptomaines has generally been responsible for the

poisonous qualities which canned fish has sometimes possessed. Salmon is the kind of fish which in the large majority of cases has been the cause of the poisoning, and it is not improbable that some of it has undergone putrefactive changes before being canned. It is a singular circumstance that cooking has, as a rule, little effect in destroying these harmful toxins. The material, though cooked, may continue to have the same poisonous properties as before; but in other cases the poisonous properties may be reduced. There is no doubt the toxin poison is developed by a germ or micro-organism; and this micro-organism produces the poison from the proteid material in the food.

Whenever a case of poisoning of this kind occurs, you may have to investigate it, and you may usefully make a note or two as to how you may best proceed to find out the offending article. You will generally find that several individuals suddenly complain of the symptoms described, and you then have to ascertain from the sufferers everything which they have eaten during the preceding forty-eight hours. Make a list of all the articles which have been eaten by each person, and then strike out those which have not been eaten in common by all the sufferers. Then strike out the articles which have been consumed by the sufferers in common with the non-sufferers. This method will commonly leave you with two or three articles which have been eaten in common and *almost* exclusively by the sufferers. It will be one of these articles which has caused the mischief. The circumstance that one non-sufferer has eaten the suspected article must not be allowed to free that article from suspicion, for some individuals are capable of resisting the effects of these toxins. It is by no means easy to always decide which of the two or three articles is responsible, but with the knowledge that such conditions generally arise in connection with those I have mentioned, if one of them happens to be sausages, sardines, minced meat, or fish, you will naturally suspect that article. The analyst, of course, has means of getting out the poison, but it entails a very advanced chemical procedure; and the method commonly adopted, even when we have other means at our disposal, is to experiment on a lower animal. A dog is better for the purpose than a cat, as it is more susceptible. Take some of the suspected article and give it to the dog to eat; and if that article contains these toxins the dog will exhibit symptoms of diarrhœa and vomiting. I need hardly say that it would be your duty to condemn the whole of that consignment if the contents of only one or two tins had shown these qualities, for the reason that it is found that these toxins most commonly develop when the article has not been properly prepared

and cooked. Every one of the articles I have mentioned is sold in a cooked state; and in tins where it is found that the toxin has developed, the cooking process has generally been incomplete, and the materials perhaps badly stored prior to canning, and that is about all we know of the circumstances favouring the appearance of these toxins. It is reasonable to argue that if the process has been unsatisfactory with reference to the contents of one or two tins, it has been incomplete with reference to the remainder of the tins dealt with at the same time and received from that particular firm.

Now, as to the dangers of putrefaction. When putrefaction takes place in any of these tinned articles, it is obviously due to the improper carrying out of the process of tinning or canning. So it is necessary here just to say a few words with reference to that process. In the first place, there are two essentials to bear in mind when an article is tinned: firstly, all the germs in the material that may give rise to putrefaction must be killed; and, secondly, the tin must be sealed up so that no more germs can subsequently enter. Otherwise, in default of either of these two precautions, the contents will putrefy; and when they do putrefy, they will, if eaten, give rise to symptoms very similar to those which I have already described as caused by toxins. The first thing to do in tinning, then, is to sterilise your receptacle. The tin or glass bottle is sterilised by being put into a special oven, in which it is subjected to steam at a high temperature, sufficient to kill even the most resistent germ. The material is then put into the tin, either in a raw or in a partially-cooked condition, according to the nature of the material, and the top of the tin is soldered on. The top of the tin almost always has a little hole left in it, so that, with the top soldered on, there is left this one little opening to the interior. This hole is next closed by means of a piece of solder. The man has a stick of solder and a red-hot iron, and with the red-hot iron he touches the solder so that a piece drops over and closes the little hole. Then the tin, with its contents sealed up, is put into a steam retort, where it is kept for an hour or, sometimes, a couple of hours, at a temperature commonly about 115° C. That is well above the boiling point of water, which is 100° C. The extra temperature is obtained by keeping the steam under pressure inside the retort. As a result of this subjection to great heat, the air inside the tin expands and the tin bulges outward with the expanded gases and vapour, so that there is a slightly "blown" tin inside the steam retort. The tins are placed on a tray generally holding many dozens, and this tray is pulled out quickly from the oven, when a man, with a small gimlet-like tool which has been made hot, melts off

the drop of solder over the hole in the top of the tin. Then there is a puff, as the expanded gases and vapour in the tin get relief. The object of unsoldering is, of course, to let out these expanded gases inside the tin, and directly that has occurred the little hole is quickly soldered up again; it does not take many seconds. The tins are then once more put into the steam retort and given another sterilisation for about another hour at the same temperature; and the process of tinning is then complete. The tin is taken out, allowed to cool, and the result is that this prolonged exposure to a high temperature has killed all the germs.

All this is not done for cooking but for sterilising purposes, though, as I have said, it leads to cooking; and if the article is easily cooked (such as fruit) it is put in raw, because then the process will suffice to completely cook it. If the article requires a fair amount of cooking it is partially cooked first, and the process is finished in the retort. I should state that when semi-liquid material, such as soup, is being tinned, the blow-hole of the tin is often not soldered over but left open in the retort, and after sterilisation the hole is soldered while the contents are still at a very high temperature.

Now, in a tin with sound contents, the walls or sides, the top and the bottom, are pressed inwards or are concave. The reason for that is perfectly clear. The tin is sealed down at a high temperature, when the air is expanded, and the pressure of the air inside the tin very low, as compared with the pressure of the air outside the tin. The consequence is that the outside air is always pressing inwards the walls of the tin. It is equally clear that no putrefaction can take place inside that tin without producing gases, and those gases as they accumulate will make the tin swell out again, causing the tops or the bottom to protrude, and the sides to become convex; and if you tap such a tin there is a sound like a drum, a muffled sound—very different from the hard metallic sound produced when you strike a tin the contents of which are good. It is not often that you get putrefaction in sardines because the oil preserves them.

I will briefly refer to an alternative method of sterilising these tins: it is not by means of a steam retort, but by standing them in a liquid which consists of water containing calcium chloride; and this calcium chloride bath is a means which has been considerably used for sterilising tinned articles. A large shallow receptacle is used for holding the calcium chloride solution, which is made to boil by means of steam. The tins are stood in the bath covered up by the solution for varying periods, lead weights being often necessary to keep the tins from floating. The object

using a calcium chloride solution in preference to ordinary water is cause the boiling point of the calcium chloride solution is much higher an the boiling point of water, so that in this way you can get a hotter lution to stand the tins in. If you put sufficient calcium chloride into e water you can raise the boiling point without much difficulty to 115° , *i.e.*, 15° higher than the boiling point of water. Thus, you can expose e tins to the same amount of heat by a calcium chloride bath as you ould employ with the steam retort. I may add that I have seen the pross of cooking and sterilisation of tinned articles conducted in a shallow th of boiling water (at 100° C.), and with satisfactory results; but this only satisfactory when dealing with articles which are not injured by a olonged exposure of three or four hours.

Now, although the contents of a tin may be properly sterilised, the aterial may still go bad on account of the solder being imperfectly plied. Although the drop of solder is many times larger than the tiny le in the top of the tin, it does not always cover it, in which case the ntents will go bad in a few weeks. Then, again, the tins themlves may have minute and invisible flaws in them. A tin *must* have ams or joints, and there is an ingenious way of testing these before the ns are used. They are fixed upside down in a large tray, and water is owed to cover, but not to enter, the interior of the tins; air can then be mped into the tin from below, and if there is any flaw or defect in the etal, or any leaky joint in the tin, you will see air bubbles coming up rough the water over the particular tin at fault. You know then that at tin is not sound, and it is taken out and replaced by a sound one. at is a method of testing the tin as it reaches the factory, but of course cannot be utilised to test the final soldering up of the tin.

I have indicated to you that if the contents of a tin are good you do t get the drum-like sound of a "blown" tin, but you get rather a hard, etallic sound when you strike it with the fingers or knuckles. The ason is that there is no accumulation of gases to act as a buffer, which ways produces the characteristic sound. You get that metallic sound est when the material happens to be a liquid, and you will note how very istinct it is in this tin of preserved soup. I want now to say a word or vo about what you may have been told is sometimes another means of lling whether the contents of a tin are good or bad—I refer to the esence of two solder points. It has been said that if you see two solder ints in a tin it is a very suspicious sign of the contents of the tin having ne bad, the assumption being that some dishonest tradesman has tapped e tin by means of a gimlet-like instrument known as a "brogue," to let

out the gases of putrefaction, and then has soldered up the opening so that the tin has all the appearances of a sound tin. I need hardly tell you that in these cases it would not be sufficient to let out the gases and then reseal the tin, because the process of putrefaction would still go on, and that it would be necessary to put it into a steam retort and sterilise the contents again. That might be done, and there have been recorded cases, but it would not be done by a responsible manufacturer, who is always ready to take back bad tins. I do not believe it would be done by retail men in this country; it would not be worth the trouble, and they do not possess the necessary plant; but there are circumstances abroad which may lead to the practice, where, for instance, it is difficult and costly to get fresh supplies. There have been cases to my knowledge at the Cape, and some of these re-soldered tins were seized quite recently at Port Elizabeth, and sent to me.

I do not think, as a rule, you can attach much importance to the two solder points, for it often happens that they are no indication whatever of fraud, and the dishonest tradesman would generally find it easier to melt the solder over the original opening and then re-solder it if he really wanted to commit fraud. Actually, too, in many cases it is the practice to make two soldered points, and that circumstance arises in this way: A soldering point is always provided in the top of a tin, and after that is closed, the tins, if flat, may be packed sideways on the tray which goes into the oven, so as to be able to sterilise more of them at one time. Then, when they are taken out, instead of unsealing them at the solder point, they are kept in their original position, and a fresh hole is made at the side to let the vapour and expanded air out, and this is soldered up. It is a matter of convenience to make a second blow hole; it can be done quicker than turning the tins round to their previous position and unsealing the original hole. Moreover, some firms make it a practice not to unsolder the original hole, but always to make a fresh hole and solder that, when dealing with certain tinned articles. In another direction I would caution you from one or two cases that have come under my own notice. The apparently two solder points have not both been solder points in actual fact. The men who seal up the tins, although they are very expert, sometimes drop a piece of solder (a splash of solder) on to the tin, and this does not cover a hole at all. It is not necessary to have blow-holes at all in the case of condensed milk, jams, and syrups, and in some brands no solder point is to be found. These materials are first cooked and then poured hot into the can, which have concave ends, when the contents cool down. The sugar acts as the preservative.

I do not think it necessary for me to go into the question of the amount of heat required for the different articles. It is perfectly clear that to sterilise the different articles of food varying times and varying temperatures are required; some articles are much more easily sterilised than others. In fact, so much difficulty is experienced with some articles of food that they have to be cut up in order to insure that the heat will get right through and sterilise them completely. It is a very common thing, for instance, to cut up pears and apples before they are tinned, and tomatoes are found to be articles which are difficult to preserve in a tinned condition; the amount of heat required to thoroughly sterilise them and to kill every germ which might possibly give rise to putrefaction is very considerable.

There is a disposition in this country to prefer articles in glass bottles to those preserved in tins. Just a word as to this, for the preference which has been shown to articles of food preserved in glass has led to a very questionable practice in this country. Not long ago I was candidly told, when inspecting a large manufactory in London, that owing to this preference of the British housewife, certain tinned articles, which are largely imported from abroad, are simply transferred to the bottles in this country, and that this is a very general practice. The reason for this is that in practice it is found so much easier to transfer the articles from tins than to preserve them in the first instance in bottles. There is no method of sealing a bottle so simple and so perfect as the solder seal on a tin. With a bottle it is more difficult to get a seal which is perfect. Thus, generally speaking, bottled articles do not keep so long, and are not so reliable as tinned articles. Then, again, there is the waste due to fracture and the greater weight, both of which circumstances contribute towards making them so much more costly than tins. The advantage of a bottle is that the glass yields nothing whatever that is injurious to the juices or other contents, and it is cleaner in appearance. A special glass has to be used to stand the heat, and that is another circumstance in the use of bottles which leads to the extra expense. On the other hand, glass bottles, unlike tins, can generally be used again and again. Bottles are almost invariably sealed by means of an indiarubber ring or washer put round a metal stopper or cap. The bottle is generally filled and stoppered, and a metal spring holds down the stopper tightly, but not so tightly that when placed in a steam retort, the expanded air will not be able to raise the stopper and spring when a certain pressure is reached, and to escape. After the bottle has been kept in the oven for about two hours, it is taken out, the spring removed, and you have your bottle sealed. You

will have to exert considerable force to remove that stopper, because there is a partial vacuum in the bottle which is apparently sucking in that stopper, which with its rubber washer forms a very efficient seal. That is one of the most efficient ways of sealing up a bottle. The rubber rings must be new and sound, or else they will not act efficiently. It is the practice of many responsible firms to keep material they have canned for several weeks on their premises to see that it is keeping sound before they send it out.

Now, let me add a word or two with regard to the antiseptics that are added to tinned or bottled articles of food. You may take it when antiseptics are added it is because the proper means are not adopted to insure sterilisation—to prevent, in other words, the ill-results from bad working or the use of poor or dirty material. As a rule, you will only find antiseptics added by second-rate firms, and to the cheapest articles. The chemical antiseptict commonly used to preserve such food are borax and boric acid, salicylic acid, formalin, benzoic acid, sulphurous acid, vinegar, and salt. With the exception of the two last mentioned, the most common of all these is undoubtedly a mixture of borax and boracic acid, and perhaps it is the least harmful of the other chemical antiseptics except vinegar and salt. It is not a drug which gives rise to serious symptoms, when the average individual takes small quantities of it, although, like the others, it delays digestion; but there is evidence that healthy adults who have taken as little as fifteen grains of it every day have suffered from vomiting, diarrhœa, depression, and certain skin eruptions. You are not likely to come across such symptoms as these as a result of taking one article of food, for it is not necessary that as much as fifteen grains should be added to the amount ordinarily consumed of any one article; but the objection to the use of these antiseptics is on account of the possibility of their being ignorantly used and applied in unnecessarily large quantities. They are used by persons who do not know how much is required, and they may be given in food to susceptible infants and invalids. Besides, it is also to be borne in mind that although you may not find a large amount in any one article of food, you may total it in the two or three articles together served for one meal. Thus, you may get an accumulation of small doses of antiseptics which may prove injurious. Take, for instance, boric acid, and an ordinary breakfast—Nowadays you are very likely to get it in your sausage, or in your ham and bacon, and very likely in your preserve, butter, and milk, so that although you obtain only a little boric acid with each article, you may

yet be taking a considerable amount altogether. There is no easy way to detect the presence of antiseptics; and most of you would not be circumstanced so as to enable you to conduct such tests.

The preservatives to be specially sought for are—in meats: boric acid and borax, salicylic acid, and sulphites; in milk and milk products: formic aldehyde, boric acid and borax, and occasionally salicylic acid; in jams, jellies, mincemeat, and table delicacies: benzoic acid and salicylic acid or their salts, and occasionally boric acid.

This employment of chemical agents, which will prevent the development of the micro-organisms concerned in putrefaction, and termed "antiseptics," is extensively practised. There is no doubt that the unrestricted use of these should be condemned, for although in the case of those more commonly employed the recorded instances in which the practice has caused harm to the consumer are few, the ignorant employment of large quantities may effect slight and indirect injury to health, and are capable of seriously interfering with digestion. Salicylic acid is depressing, benzoic acid is irritating, sulphurous acid is a gastric irritant, and formaldehyde has a strong tendency to combine with proteids and to harden them and reduce their digestibility.

Moreover, the use of chemical antiseptics is not necessary; and they facilitate an uncleanly, slovenly treatment of food, and render it possible to preserve articles in incipient decomposition for some time with every appearance of freshness.

There is a feeling in this country that if these antiseptics are permitted to be used in articles of food, the fact of such addition should be shown upon a label, indicating that an antiseptic has been used, the nature of the antiseptic, and its amount, so that those individuals who do not want to continuously drug themselves need not do so.

The Departmental Committee appointed in 1899 to consider the subject of the use of antiseptics and colouring agents in food, in their report (1901) made the following recommendations:—

1. That the use of formaldehyde or formalin, or preparations thereof, in food or drinks be absolutely prohibited. That salicylic acid be not used in a greater proportion than one grain per pint in liquid food, and one grain per pound in solid food; its presence in all cases to be declared.

2. That the use of any preservative or colouring matter whatever in milk offered for sale in the United Kingdom be constituted an offence under the Sale of Food and Drugs Act.

3. That the only preservative which it shall be lawful to use in cream

be boric acid, or mixtures of boric acid and borax, and in amount not exceeding 0·25 per cent. (expressed as boric acid), the amount of such preservative to be notified by a label upon the vessel.

4. That the only preservative which it shall be lawful to use in butter and margarine be boric acid, or mixtures of boric acid and borax, to be used in proportions not exceeding 0·5 per cent. (expressed as boric acid).

5. That in the case of all dietetic preparations intended for the use of invalids or infants, chemical preservatives of all kinds be prohibited.

6. That the use of copper salts in the so-called "greening" of preserved foods be prohibited.

I come next to the question of harmful colouring agents. Now, the colouring agents which are used at the present time are almost all of them harmless, being obtained from the animal or vegetable worlds. Green, for instance, is obtained from the green colouring matter (chlorophyl) of plants, extracted from parsley or spinach, or some other plant which is particularly rich in green colouring matter. Harmful colouring agents are mostly mineral, consisting of metals such as copper, arsenic, chromium, etc., but these nowadays are practically never used. It therefore comes to this, that amongst colouring agents now in use copper is about the only one to which we need give a minute's consideration. Copper has been used extensively in preserved peas and beans for maintaining the green colour. The method is this: the peas are washed in a weak solution of sulphate of copper: they are then taken out of that solution and washed in clean water—they are only in the solution for a moment—then they are put into the tins and cooked and soldered down. It is found that this temporary exposure to the copper gives them a beautiful green tint and preserves them. We cannot preserve the fresh green colour of peas and beans, and without copper it is impossible to give them their natural fresh appearance. You may do it to some extent by the use of sugar, which is also a powerful preservative, but for the peas to retain a good colour copper seems to be essential. Manufacturers in this country are practically dropping this particular line, because they do not want to be subjected to prosecutions, or to feel that they may be doing something which is harmful, and they cannot successfully adopt any alternative method. The consequence is that our tinned peas, almost all of them, are imported from France or other countries. Here is a tin labelled, "The colour of these peas is preserved by sulphate of copper, the smallest quantity possible being used to insure the finest quality," and you will observe that it comes from France. You can sometimes tell if sulphate of copper is present in a large and harmful quantity by inserting the blade of

a knife and seeing if there is any deposit of copper on the steel after a little while. It is distinctly present in this case, but the test is too coarse to indicate the small quantities generally employed. The copper compound, with the vegetable matter, is soluble in distilled water, to which a drop of hydrochloric acid and a teaspoonful of Benger's liquor pepticus has been added, the whole being kept at a temperature of 37° C. for several hours. The old theory that the copper formed with the legumen of the peas a compound which is *quite* insoluble by the gastro-intestinal secretions is therefore erroneous. There is no doubt that if much copper is taken up it is harmful, but the general consensus of opinion in this country appears to be that having regard to the small amounts of preserved peas consumed there is no danger in the process so long as the manufacturer does not employ more than one grain of copper to the pound of peas. But it is a common practice to add from one to three grains to the pound, which is an undoubtedly injurious amount, and it ought to be prohibited.

With reference to colouring agents generally, there is a way by which you can form an idea as to whether the colouring agent is harmful or not —an easy and quick method. See if you can extract the colour of an article in water, pound the material up in water, and see if the colour is taken up in clear solution. I have taken a sweet from this bottle, and dissolved it in the water, which has taken up the red colour. Now add a little sodium hypochlorite solution to see if the colour is discharged. If that colour is removed, it is almost certain that it is derived from the animal or vegetable world, and is therefore harmless. If the colour is insoluble in water, and not bleached by sodium hypochlorite, it is in all probability of a harmful nature and of mineral origin, and the presence of copper, zinc, lead, chromium, and arsenic, should at least be tested for.

Now, with regard to the impurities yielded by the tins, some of which, as we have seen, may be dangerous. There have been cases in which the metal of the tin has been dissolved by the juices of the material put into it. There is particular risk of this if vinegar is used (as in pickles, fish, &c.), or if the tin contains vegetable matter which furnishes vegetable acids, or if the tins contain oil (as in the case of sardines), for the acid or oil helps to dissolve up some of the metal of the tin. Tinned asparagus has been found to be a great offender in this respect; asparagus produces an acid which attacks the tin with considerable rapidity. For this reason, tins in which much acid-producing materials are to be preserved (as for, instance, plums) are not infrequently lacquered inside. It is a common practice in such cases to provide this coating of lacquer inside the tins.

Even when no material has been used for preservative purposes, an acid reaction is to be found in the liquids of practically all cans of meat, fish, and fruits; the acid being organic in nature. Sometimes, in these cases, more or less corrosion and often some discolouration of the interior is to be observed, and metals (tin, zinc, or lead) are present in the liquid. Arsenic, copper, and zinc have been dissolved from tins, and have rarely been found in the juices, but lead and tin have been more frequently found, and poisonous symptoms have been traced to both metals. Lead has sometimes been dissolved from the solder, hence it is very important in tinning to keep the solder outside entirely; there must not be any solder (which consists of about two parts of lead to one of tin) projecting inside the tin, so that the food or juices can come in contact with it. At the present time you may take it that there is very little lead ever exposed to these articles of food, and the solder is kept carefully outside; but some of the enamels and varnishes used to protect tins contain a little lead. The tins used are of iron, protected by a thin coat of tin inside and out; and it is most important in selecting tins to examine them carefully in order to see that the tinning has been properly done. Some firms produce tins very imperfectly tinned, and which you can see with a magnifying glass contain flaws. If the coating of tin is poor, the tin will not last, and that is an important practical point if the goods have to be preserved for a long time. If the tinning will not last, then the iron beneath it is soon exposed to the atmosphere and rusts, and the rusting process will eat through the metal, forming little pores, which let in the air, and with the air the germs that cause putrefaction. One firm I know of, lost a big Government contract during the South African War, because they would not supply poor and cheap tins. The firm that got the contract at a lower price used indifferent tins, with the result that the contents of many went bad.

It is necessary that the plating should be of pure tin, unless a substitute that is more satisfactory can be found. Sometimes an alloy of tin and lead is used, called "terne plate," which contains about two parts of tin to one of lead. The use of this should be prohibited, and even pure tin leaves much to be desired.

Tin is slightly soluble in acetic and other organic acids, but its absorption is very slight in the gastro-intestinal tract. Dr. J. Brown found that in potted meat the metal is chiefly found where the meat is in contact with the soldering and plating; in fruits it is found in the syrup, and also throughout the substance of the fruit. Mr. Wynter Blyth examined over twenty cans of fruits, and found tin in every one, the amount being 1·5

to 11·05 grains per pound. Dr. Sedgwick found tin salts in every case that he examined of apricots, pine apples, peaches, and tomatoes. Dr. Luff examined syrup from a can of cherries, which had caused metallic poisoning, and found the enormous amount of 1·9 grains of oxide of tin to each ounce of juice, and each person poisoned had taken from four to ten grains of malate of tin.

The last point that I want to bring before you is with reference to the cases of poisoning ascribed to the metals taken up from the tins in which the food has been preserved. In Germany, and in this country, too, the general view is that most of these cases are to be explained, not by the trace of metal taken up by the juices, but to those toxins which develop, and to which I alluded at the commencement of the lecture. They have not generally been real cases of metallic poisoning, but cases of toxin poisoning, and perhaps a great deal more than is necessary has been made of the risk of the trifling amounts of tin or lead which are sometimes taken up by these tinned articles of food. Aluminium is a metal that probably has a future before it for canning purposes. It has been adopted to some extent in the German army; it has the advantage of being light (about one half the weight of iron) and is not in any way affected by damp. It is very durable, and furnishes nothing at all injurious to health to any material which may be preserved in it, although it should be said that alcohol and acids have a slight action upon it.

Aluminium is tough and fibrous. It is not attacked by organic acids. If by any chance a trace of aluminium should be dissolved, its salts are not nearly so dangerous as those of tin and lead. But the price of aluminium is at present so high that its general use for canning purposes is out of the question.

Dr. J. Brown, of Bacup, in a paper read at the Congress of The Royal Sanitary Institute in 1897, gave some sound advice: "Avoid the very cheap brands, and only purchase canned foods when the name of the firm is given upon the label. In regard to canned fruits, pears and apricots have shown the largest amount of dissolved lead and tin, probably due to the large amount of acid in the juice of these fruits. Pine-apples have shown he least amounts, and in my opinion they are the safest fruit to buy under he present mode of canning. Avoid all fish, especially salmon, that has yellowish, soft, and friable condition, showing that putrefactive changes ave taken place before canning. Examine the plating of the inside of le can. This should have a silvery-white appearance; if it is corroded discoloured, reject it. If it has a bluish-slate colour it will be risky,

especially if it contains fruit. Any tin showing solder on any internal surface should be rejected."

The importation of canned foods in which the tin used for the plating contains more than one per cent. of lead, or the solder contains more than ten per cent. of lead, should be forbidden. This law has been in force in Germany since 1889. It should be required that the soldering should be entirely on the outside of the can. This regulation is enforced in France and Germany.

The date of canning should be legibly stamped on each can. This is especially important in regard to fruits. It has been proved by Professor Gautier, of Paris, that the amount of metal dissolved increases with keeping. But there are many advantages in consuming the contents of these tins in as fresh a state as possible; and it is very desirable that the public should be informed whether the material they propose to purchase was canned as recently as a few months ago, or as remotely as a year or two.

OTES FROM THE REPORTS OF THE MEDICAL OFFICERS OF HEALTH.

HE reports of the Medical Officers of Health, which have been forwarded to the Library of the Institute, contain a number of matters general public health interest, and as these reports are not easily ilable to the Members of the Institute, it is thought that extracts ling with some of the more important items would be of interest to the mbers and Associates.

GIPSIES AND THE PUBLIC HEALTH ACT.

xtract from the Report of the Medical Officer of Health for Blackpool, 1904.
FRANCIS J. H. COUTTS, M.D., D.P.H.(VICT.), F.C.S.

Several circumstances had directed attention to the mode of life of the sies at South Shore, and other van and tent-dwellers, and in the early part of year the Sanitary Committee directed me to have the gipsies' camp regularly pected, and I was also empowered to take proceedings for any breaches of by-laws made in 1901, but up to that time never strictly insisted on. In connection analyses were made by the Public Analyst of four samples of er, two from the wells in the sand, dug by the gipsies; one from the well ring the cottages behind the Star Inn; and one from the pump at the Star . The gipsies' wells were found to contain water unfit for drinking purs, and a tap for the supply of town's water was put up at a convenient ance from the camp.

In March two gipsies were summoned under the by-laws for want of proper r supply, and for want of proper sanitary conveniences. Each of them was 1 5s. and costs in each case.

In May an encampment of three caravans and two covered carts, with a munity of about 18 persons, encamped on some spare ground adjoining tegate Drive, a most unsuitable position. They were summoned under the aws for want of proper water supply and want of sanitary accommodation. defendants did not appear, having left the town the day after the sumses were served. They were fined 10s. and costs on each summons.

In June another van dweller encamped on New Road, and he also was fined nd costs on each count. In the same month another man was fined similar unts, and later a woman who was occupying a van on Central Drive was moned under the same sections of the by-laws, and a similar penalty cted.

These cases seem to have been sufficient, other van dwellers complying with requirements promptly on coming into the town. The gipsy camp was ed frequently during the season, and less frequently afterwards, 66 inspecs being made altogether during the year, and steps were taken to prevent too y persons crowding on to the camp at South Shore.

DECISIONS OF COUNCIL ON RESOLUTIONS PASSED AT SCHOOL HYGIENE CONFERENCE.

LONDON, FEBRUARY, 1905.

Continued from p. 187.

"That for younger scholars, at all events, there should be no lessons after school hours."

The Council decided to approve this resolution and to send it to the Board of Education, and to suggest that younger scholars should be defined as those under ten years of age.

"That in the opinion of the meeting of the Conference on School Hygiene ample hours of sleep according to age are essential to the well-being of growing children."

The Council decided to express the opinion that in some public schools the present hours of sleep are insufficient. Also to send a copy of the resolution with the opinion of the Council to the Medical Officers of Schools Association.

"That H.M. Inspectors of Schools should be qualified in hygiene and sanitation, and familiar with the development of child life. This meeting, therefore, urges the Council of The Royal Sanitary Institute to memorialise the Board of Education to protect health in school life by appointing at least some men and women Inspectors who are specialists in school hygiene."

The Council decided to send this resolution to the Board of Education, and to suggest that H.M. Inspectors of Schools should have a knowledge of the conditions of health essential to the carrying on of the work of instruction in schools.

"That the Council of The Royal Sanitary Institute be asked to direct the attention of the Board of Education to the results of an inquiry made in both urban and rural schools, among inspectors and teachers, which indicates the great importance of appointing suitable and properly qualified *women* Inspectors for infants' and girls' schools of all grades, for pupil teachers' centres, and for training colleges; also that the inspection of domestic subjects should be entrusted to women."

The Council decided to send this resolution to the Board of Education.

"That it is the opinion of this meeting that there should be regular and systematic medical inspection of children in schools of all grades, and it requests that the Council of The Royal Sanitary Institute will bring this important matter before the educational authorities of the country."

The Council decided to send this resolution to the Board of Education,

mitting the words "regular and systematic medical inspection" and substituting the words "medical and physical inspection."

"That the question of the control of schools, private or otherwise, from a sanitary point of view, be referred to the Council of The Royal Sanitary Institute for consideration, with the view of such representation being made in the proper quarter as the Council may think fit."

The Council decided to urge that special powers of entry into all schools e given to sanitary officers.

"That in view of the great responsibility thrown upon teachers of all grades, in respect of the hygienic management of schools, and the growing demand that they should be qualified to introduce some elementary instruction in the general principles of hygiene into the curriculum of their schools, this meeting earnestly requests the Council of The Royal Sanitary Institute to lay the following points for consideration before the President of the Board of Education:—

The fragmentary and incomplete character of the five syllabuses in school hygiene, set out in Appendix C. of the Board of Education regulations for the training of teachers, 1904.

The Council do not consider it advisable at present to endorse this recommendation.

The great importance of emphasising officially the need for some general provision for the instruction in hygiene of those teachers in both secondary and elementary schools whose period of training is past, or who have never entered a training college or taken a diploma in education.

The Council decided to approve this suggestion as very desirable if und practicable.

The opinion expressed by a special committee of the British Association in two successive years that the Board of Education should be memorialised to adopt or to recognise a thorough and practical test of a teacher's knowledge and experience of the applications of health principles in school life."

The Council decided to approve this resolution and to forward it to e Board of Education.

The Council also decided to make the following recommendation to the onsultative Committee of the Board of Education:—

That Hygiene, with especial reference to School Hygiene, should be placed on the list of those subjects set out by the Teachers' Registration Council, so as to admit those who have qualified for Hygiene in its bearing on School Life under The Royal Sanitary Institute, or other bodies, to be registered under Column B, providing they hold a University Degree as the L.L.A., or others.

NOTES ON LEGISLATION AND LAW CASES.

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For full text of these see Law Reports, which can be referred to in the Library of the Institute.

LIGHT AND AIR—*Obstruction—Ancient Lights—Nuisances—Cause of Action—Injunction of Damages.*

In an action for obstruction of ancient lights by the owner and occupier of a suburban dwelling-house, it appeared that the room principally affected was lighted by two windows, one of which only was obstructed by the defendant's building, and that as to that there was still left more than 45° of light. Kekewich J. found that although the room was still well lighted, there was a large obstruction of light by reason of the defendant's building, and that the letting and selling of the plaintiff's premises had been substantially diminished, and he held that the obstruction constituted an actionable nuisance within Colls v. Home and Colonial Stores, Ltd. (1904) A.C. 179 and granted a mandatory injunction:—

Held, by the Court of Appeal (Romer L.J. dissenting), that the plaintiff had a cause of action, but that the remedy ought to be damages.

Held, by Romer L.J., that the plaintiff had no cause of action.

Per Vaughan Williams L.J.: The effect of Colls *v.* Home and Colonial Stores, Ltd., is that in order to support an action of nuisance by obstruction of ancient lights, the obstruction, in the case of a dwelling-house, must be such as sensibly to interfere with the comfortable and convenient occupation of the plaintiff's premises according to the ordinary notions of the citizens of this country, and in determining that question the quantity of light coming from other sources is to be taken into consideration; but the mere fact that the quantity of light finding access to a particular room after an obstruction amounts to a sufficiency for the purpose for which the room was designed will not necessarily exclude the conclusion that the obstruction has interfered with the comfort and convenience or usefulness of the room according to the ordinary notions of mankind.

Per Cozens-Hardy L.J.: *Semble*, Colls *v.* Home and Colonial Stores, Ltd., only decided that an obstruction which neither lessens the letting or selling value of the house, nor materially affects the comfort or convenience of the occupier, does not in law justify an action, even though a large proportion of light previously enjoyed has been lost.

KINE *v.* JOLLY. C.A. 480.

LONDON—*Drains—Public Health—Nuisance—"Acts or Defaults" of two or more persons—Right to Contribution—Public Health (London) Act, 1891, 54 and 55 Vict. c. 76) ss. 4, 5, 120.*

The defendants' premises were drained through a drain running under plaintiff's premises, which drain for part of its length carried only the defendants' drainage, and for the rest of its length carried the drainage of both premises. The defendants had a right so to use the drain. A nuisance having arisen on the plaintiff's premises owing to the whole of the drain being defective and permitting sewage to escape, the sanitary authority took proceedings against him, under ss. 4 and 5 of the Public Health (London) Act, 1891, and obtained an order upon him to do the work necessary to abate the nuisance. The plaintiff did the work and abated the nuisance, all the work being done upon his own premises:—

Held, that the plaintiff could not recover from the defendants a proportionate part of the costs of abating the nuisance, as being one of two or more persons "by whose act of default" the nuisance had been caused, within the meaning of s. 120 of the Public Health (London) Act, 1891.

NATHAN *v.* ROUSE. Div. Ct. 527.

SALE OF GOODS—*Purpose for which Goods supplied—Reliance on Seller's Skill—Milk required for Consumption—Implied Warranty of Fitness—Sale of Goods Acts, 1893 (56 & 57 Vict. c. 71), s. 14, sub-s. 1.*

By s. 14, sub-s. 1, of the Sale of Goods Act, 1893, it is enacted that "Where the buyer, expressly or by implication, makes known to the seller the particular purpose for which the goods are required, so as to show that the buyer relies on the seller's skill or judgment, and the goods are of a description which it is in the course of the seller's business to supply . . . . there is an implied condition that the goods shall be reasonably fit for such purpose."

The defendants, who were milk dealers, supplied the plaintiff with milk which was consumed by himself and his family. A book in which the daily supply was entered was interleaved with a printed notice of the particular precautions taken by the defendants to supply milk, pure and unadulterated and free from the germs of disease. The milk supplied contained germs of typhoid fever, and the plaintiff's wife was infected thereby, and died. The existence of the germs could only be discovered by a prolonged investigation. In an action, upon an implied warranty under s. 14, sub-s. 1, of the Sale of Goods Act, 1893, to recover the expenses to which the plaintiff had been put by the illness and death of his wife:—

Held, that the purpose for which the milk was supplied was sufficiently made known to the sellers by its description, that there was evidence that the buyer relied on the seller's skill, and that there was an implied condition under the Act that the milk was reasonably fit for consumption, although the defect was not discoverable at the time of the sale.

FROST *v.* AYLESBURY DAIRY COMPANY. C. A. 608.

MEAT SEIZURE—*Authority of Inspectors—Public Health Act.*

At West London, Frederick Griebler, pork butcher, of King's Road, Fulham, was summoned at the instance of the Fulham Borough Council for having on his premises about 5lb. of meat which was unfit for human consumption. The meat was seized in the defendant's shop and condemned by the magistrate. Mr. Ricketts, jun., for the defendant, maintained that the summons was bad, inasmuch as the inspector had acted *ultra vires* by initiating proceedings without having first obtained the authority of the Council or of the Sanitary Committee. Under the general section of the Public Health Act 107, sub-section 3, the sanitary authority were compelled to keep a book containing a record of all complaints, such report to be laid before the sanitary authority or a committee thereof at their next meeting, and it should be the duty of the sanitary inspector, subject to the direction of the sanitary authority, or a committee thereof, to take proceedings. It was admitted, continued Mr. Ricketts, that the council had received no notice of the proceedings. Mr. Humphreys, the solicitor to the borough council, contended that the general section which Mr. Ricketts had quoted referred to complaints about nuisances, and not to such matters as the seizure of bad food. Mr. Lane, K.C., said that Mr. Ricketts was misinterpreting the sub-section, which empowered the inspector to take action, or, in the legal words, "to make complaint before justices" failing the direction of the sanitary authority. There was no power compelling them to give directions to the inspector. The defendant denied that the meat was bad, declaring that a "chuck bone" which the inspector found was intended for the waste tub. As there was a previous conviction against him, the magistrate imposed a penalty of £15; he expressed a willingness to state a case on the legal point if desired.—"*Times*," *Saturday, May 13th, 1905.*

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RECENT METHODS OF REHOUSING TENANTS DISPOSSESSED FROM INSANITARY PROPERTY.

By FLETCHER T. TURTON, F.S.I.,
Deputy Surveyor, Corporation of Liverpool.

Read at Sessional Meeting, Liverpool, April 25th, 1905.

BEFORE dealing with the subject matter of this Paper, I think I ought for a few minutes to explain how the necessity for rehousing ᵉ working class population arises in Liverpool.

In the year 1864 it is estimated that no less than 22,000 houses in this ᵗy were structurally insanitary, that is, they were back-to-back, without ᵒ through ventilation or yard space, situated in courts which very often ᵈ only a tunnel entrance, and consequently there was an entire absence any circulation of air. The sanitary arrangements were also very ᶠective, and in most cases there was only one convenience for the ᶜupants of five or six houses.

In this year there was passed a Local Act, known as the Liverpool ᵑitary Amendment Act, 1864, which gave to the Corporation of Liver-ᵒl extensive powers for dealing with this class of property.

Under this Act the Medical Officer of Health is empowered to report ᵃt certain houses (specifying them) are unfit for human habitation. ᶦis report is subsequently brought before the Grand Jury at Quarter ᵉssions, who decide whether or not the houses included in the report are ˢanitary and ought to be demolished. Their decision in favour of ᵐolition is called a "*Presentment*," and the compulsory powers of the ᶜt then come into operation. The Act also provides that in certain

cases the Council might require structural alterations. Presentments of the Grand Jury have always taken the form of complete demolition as indicated by the following, which is a copy of the form of Presentment usually employed:—

> "CITY OF LIVERPOOL, To Wit.—The Jurors for our Lord the King upon their oath present that certain premises, that is to say, the dwelling-houses known as Numbers . . . . . . in . . . . . . Street, in the said City, contiguous to a certain Court within the said City, known or designated as Number . . . Court, in the said Street, and specified in the Report of the Medical Officer of Health for the said City, dated the . . . day of . . . . . are unfit for human habitation, and in a condition, state, and situation, injurious, dangerous, and prejudicial to health, and ought to be demolished, in pursuance of 'The Liverpool Sanitary Amendment Act, 1864.'"

In September, 1902, a street-to-street examination of the whole of the City revealed the fact that the number of structurally insanitary houses then remaining to be dealt with was 9,943, notwithstanding the fact that up to that period the Corporation had under the Local Act previously mentioned dealt with something like 8,000 houses, the balance, about 4,000, having been demolished by owners for the purpose of providing sites for business purposes.

A recent estimate of the houses still remaining to be dealt with has been made, and the result is as under:—

Number of structurally insanitary houses as per Survey made in September, 1902		9,943
Less Hornby Street and Upper Mann Street, in course of being dealt with under the Liverpool (Housing of the Working Classes) Order, 1902	710	
Less number of houses included in the 18th Presentment made 8th June, 1904	370	
Less number of houses demolished by Agreement, owners retaining the sites	30	—1,110
		8,8[illegible]
Number of structurally insanitary houses demolished by owners for business purposes, say		2[illegible]
Estimated number of back-to-back houses remaining*		8,6[illegible]

* Many of these being in wide open courts, are very far removed in condition from those which have been demolished, and consequently do not demand immediate attention.

The death-rate of the areas dealt with averaged about 60 per 1,000 per annum. This will give some idea of the serious insanitary conditions which prevailed, although I cannot say that the whole of this excessive death-rate was due to the insanitary state of the property; the habits, squalor, and poverty of the tenants must account for a great deal.

The demolition of so much property naturally caused a great displacement of population, and although private enterprise had built dwelling-houses to the number of between eight and nine hundred on sites sold by the Housing Committee for that purpose, and the Corporation had themselves erected St. Martin's Cottages, Victoria Square, and Juvenal Dwellings, I can safely say that the number of tenants who had been displaced and who occupied a dwelling-house provided either by private enterprise or the Corporation was infinitesimal, a fact which it is not difficult to realise when the rents of the houses provided by private enterprise were at any rate generally double those paid by the dispossessed tenants, and those in the Corporation Dwellings much in excess of the same rents.

The policy of selling cleared land for the erection of dwellings, and leaving the work to private enterprise, may be best described as a levelling-up policy; but this is entirely inadequate, as no provision whatever is made for those who have been dispossessed, and who constitute, as a general rule, the poorest class of the population, and, consequently, least able to take care of themselves in the matter of housing.

In the year 1899 application was made to the Local Government Board for a further loan for demolition purposes, and the Board then required a statement of the proceedings of the Corporation with regard to rehousing calculated from the year 1885. This statement revealed the fact that although the Board only required accommodation to be provided equal to 50 per cent. of those who were dispossessed, there was up to that year a deficiency in accommodation for 3,056 persons, in respect of whom the Local Government Board required the Corporation to give an undertaking to provide accommodation. Consequently in October, 1899, the City Council passed the following resolution:—

> "That an assurance be given to the Local Government Board that the Corporation will make provision for the accommodation of the 3,056 persons mentioned in their letter, upon the land belonging to them in Kempston Street, Gildart Street, and Constance Street; Dryden Street and Rachel Street, and Gildarts Gardens and Ford Street, and upon the sites which the Corporation may acquire under the 16th Presentment, and that, if these sites are insufficient to provide such accommodation, they will erect, or cause to be erected, dwellings upon other sites to be approved by the Local

Government Board, and situate within a radius of (say) two miles of the insanitary areas."

There is no doubt that the letter of this obligation would have been fulfilled by providing dwellings of the type erected in Victoria Square, or by continuing the sale of land for the erection of houses by private enterprise on the various cleared sites, but the Housing Committee felt that they should ask the Council to fulfil this obligation not only in the letter but in the spirit, and accordingly since the date of the resolution in question the Housing Committee have erected a number of houses which are specially adapted for occupation by those that were dispossessed.

In addition to all this work, the Corporation have also powers under the Housing of the Working Classes Act, 1890, to demolish the houses situated on two areas: the one in the northern end of the city, called Hornby Street Area, and the other at the southern end of the city, called Upper Mann Street Area. In the case of Hornby Street Area the Corporation are under an obligation to provide for as many tenants as are dispossessed, while in Upper Mann Street Area the proportion required by the Local Government Board to be rehoused is something like 69 per cent. In these two cases also the Housing Committee only admit as tenants to their property those who have been dispossessed by their operations.

The various obligations of the Corporation to rehouse the persons dispossessed involved extensive building undertakings in the shape of building of a huge character, and has resulted in the City Council and the Local Government Board approving of the following schemes:—

	Tenements.
Arley Street	46
Gildarts Gardens	229
Dryden Street	182
Kempston Street, &c.	79
Kew Street and Newsham Street	114
Adlington Street	272
Stanhope Cottages	60
Mill Street	55
Hornby Street	445
Upper Mann Street	88
Clive Street and Shelley Street ...	84
Eldon Street	12
	1,666

The following is a short description of the new houses erected on

t portion of the Hornby Street Area; these are the newest type of ise as well as the most recently erected.

The new dwellings are on a site which is being acquired by the poration as an "unhealthy area" under the powers of the Housing the Working Classes Act, 1890. The main street, Hornby Street, is feet wide, and runs from Vauxhall Road to Scotland Road.

The total number of insanitary houses proposed to be acquired is 511, addition to which there are 23 sanitary houses, making a total i34. The population of the insanitary houses is 2,431.

The new dwellings comprise 23 blocks or 445 dwellings, which it is mated will accommodate 2,476 persons. There are 50 four-roomed ellings, 257 three-roomed dwellings, 125 two-roomed dwellings, and 12 -roomed dwellings, a keeper's house, seven shops, and a recreation und containing about 1,755 square yards.

In Hornby Street the new dwellings are set back from the present line itreet, so that for a considerable portion of the length of this street the th between the main line of the new dwellings will be 70 feet.

Each house is provided with a separate water closet, and also with a arate scullery.

The buildings as a whole are three stories in height, each living-room itaining at least 150 superficial feet, the principal bedroom 125 super-al feet, the second bedroom 100 superficial feet, and the third bedroom, ere one is provided, between 80 and 90 superficial feet.

The average height of the rooms is 9 feet clear. The materials used he construction are local grey brick with red brick dressings, buff terra a being sparingly used and only in the entrances. All the staircases lined with glazed bricks, the roofs slated, and the floors constructed ι small steel joists with coke breeze concrete, the flooring boards being ed direct on to this. The ashes are discharged into bins by means of ts at the back, and are collected daily by carts.

The first portion of the scheme, which has been completed, has lved the demolition of 145 houses. The new dwellings on the site ain 138 houses. It is now proposed to proceed with the demolition second portion, and the dispossessed tenants from such portion will py the dwellings just completed. In this manner it is thought that whole scheme will be carried out in three portions.

The plans for the whole of the scheme have been approved by the al Government Board, who have allowed eighty years for the repay-t of the loan for the purchase of the land, and sixty years for the yment of the loan for the erection of buildings.

The Corporation of Liverpool have, as previously mentioned, had many schemes in hand for the housing of the working classes, but this is by far the largest which has been attempted. The total cost of the scheme is estimated at £150,000.

The death-rate in the new dwellings at the present time is approximately 25 per 1,000 per annum, but it must be remembered that these families have throughout the whole of their existence lived under conditions seriously prejudicial to their health, and the removal of unhealthy families, even to healthier surroundings, cannot be expected immediately to remove the bad results of living under insanitary conditions.

In all these dwellings the Housing Committee only admit as tenants those who have been dispossessed by their operations, those that have lived in houses closed by closing orders under the Housing of the Working Classes Act, 1890, and those who have been living in cellar dwellings which are also closed.

For some years past no tenant has been dispossessed by the operations of the Corporation without having been given an opportunity to occupy one of the new tenements provided.

With regard to the poverty of the tenants, this is best evidenced by the following short extract from the report of a deputation from a great Scottish municipality to Liverpool, in which it was stated that "the whole hypothec belonging to each of these tenants is of the most meagre character, and much below what would be found in the homes of labourers of the same grade in Glasgow. Its value would probably be overstated at 20s."

I am informed by a well-known guardian of the poor that several thousand families in this City subsist on an average of less than 10s. per week, and a greater number on less than 15s. per week. A great proportion of these people are at present occupying insanitary houses, and are the class of persons with whom the Corporation have to deal, and this also is evidenced by the fact that the average earnings of the tenants in the Corporation houses does not exceed more than 15s. per week.

The largest number of tenants from any one area that have availed themselves of the accommodation provided by the Corporation were those from the first portion demolished of the Hornby Street Area, where 71 per cent. of the tenants became tenants of the Corporation in their various blocks of new dwellings. This is a very large percentage. I have sometimes been asked what happened in this case to the remaining 29 per cent. It is not difficult to imagine. Sheer poverty and distress in many cases prevented some of the tenants availing themselves of the new accommoda-

tion provided, and although it is usual to say that this poverty and distress arise from drink in the main, I am not one who entirely agrees with this assertion. This poverty and distress constitute an inability to pay the rent, and all the dispossessed tenants know that it is a *sine qua non* of the Corporation that whatever the rent is, it must be paid.

Another class of persons who form part of the dispossessed are those who are able but not willing to pay the rent, who squander their small earnings in other ways, and it is part of their education to understand that one of the objects to which their earnings must be applied is the payment of rent. Of course, after this class comes the "residuum of the residue" for whom no Corporation nor any body of persons can or will provide. They are unwilling to bring themselves under the slight supervision which is given to each block of Corporation dwellings. Their lazy, indolent, and drunken habits are so far part of their nature that they are unable to free themselves from them, or to appreciate the efforts which are being made for their welfare. They probably go into any vacant houses they can find as insanitary as those which have been demolished, or into single rooms in houses sublet, or perhaps, in some few cases, into the workhouse.

The only conditions that are required of tenants entering the new Corporation dwellings are that they must behave themselves and that they must pay their rent, and it is satisfactory to be able to say that these conditions are giving little trouble in their fulfilment.

The improvement in the condition of the tenants in their new habitations is very noticeable. The cleanliness of the habitations has greatly improved. Even the little item of polishing their brass letter-plates and door handles is looked after. The provision of window blinds and curtains gradually takes place, and even occasionally efforts are made to grow plants. Another feature which is noticeable in the tenants is the efforts made to improve their habitations by adding bit by bit to their scanty stock of furniture and bedding.

Many instances are known where the tenants have by sheer misfortune had to leave their houses by reason of their inability to pay their rents. In most instances, however, they have come back again, and in several cases this operation has been repeated more than once. In one case a tenant has been ejected no less than three times, and has now been taken back again for the fourth time.

I have also noticed on my visits to the dwellings a marked improvement in the general condition of the neighbourhood, but I was not prepared to find that this improvement has been so marked as the following statistics indicate, which the Head Constable has kindly prepared for me:

	1894.				1904.			
	Drunkenness.	Assaults	Other Offences.	TOTAL.	Drunkenness.	Assaults.	Other Offences.	TOTAL.
No. of persons giving addresses in the named streets, charged with	81	40	81	**202**	34	4	46	**84**
No. of cases, which happened in the named streets, of	27	10	25	**62**	5	0	7	**12**

The figures are taken from an area situated very near the centre of the city which contained, prior to its demolition, a population of 1,393 persons, and is now calculated by the Local Government Board to provide accommodation for 1,246 persons. The returns are taken from the years 1894 and 1904, during which the whole of the houses on this area were pulled down and rebuilt. The statistics, therefore, for the year 1894 are in respect of the area in its old condition, those for 1904 being in respect of the first year after the rebuilding operations of the Corporation and the houses being occupied. These statistics are worthy of great consideration.

The Head Constable had to take for granted that all the addresses given were of residents in the streets named. This is not always the case, but even assuming it to be so, it will be seen that the item of offences against the law was reduced from 202 in the year 1894 to 84 in the year 1904.

The improvement in the condition of the neighbourhood is even more marked, for during the same period cases which happened in this particular area dropped from 62 in 1894 to 12 in 1904.

I think if any justification of the work of the Housing Committee was wanted, it is to be found to the full in the figures which I have just given you.

On the subject of the rents, which is a burning one at the present time, and which are now under revision by the Housing Committee, I will say no more than to give those which are current in the Hornby St. Area—

Ground Floor.

Four-roomed tenements	at 5s. 3d.	per week	each.
Three-roomed	„	„ 4s. 6d.	„
Two-roomed	„	„ 3s. 6d.	„

And two shops with tenements attached, 14s. and 12s. 6d. respectively.

First Floor.

Four-roomed tenements	at 5s. 0d.	per week	each.
Three-roomed	„	„ 4s. 3d.	„
Two-roomed	„	„ 3s. 0d.	„

Second Floor.

Four-roomed tenements	at 4s. 6d.	per week each.
Three-roomed ,,	,, 4s. 0d.	,,
Two-roomed ,,	,, 2s. 9d.	,,

During the last year the rents collected in the Corporation dwellings provided for the dispossessed amounted to 91·6 per cent. of the rent actually owing, a result which I venture to say is most encouraging.

Of course, in the management of this property, and particularly in the question of arrears (which is one with which the Dwellings Sub-Committee of the Housing Committee deal with every fortnight) great discretion is required. The management of this class of persons must be by the heart as well as by the head. Cast-iron rules will not apply. The manager and the superintendents of the various dwellings, who collect the rents, have to deal with each case of arrears as it arises, and in the fortnightly return which is made to the Dwellings Sub-Committee, special cases are dealt with by such Sub-Committee.

The number of houses at present provided seems to be somewhat in excess of the demand, but this arises not from the fact that the houses are not popular, but from the fact that they are reserved exclusively for those who are dispossessed; and great indignation is often expressed by would-be tenants, that because they have not been actually dispossessed by the Corporation they are not allowed to occupy the new dwellings. In fact, every one of the dwellings at present vacant could be let five times over if the Committee would only relax their rule, but they have stood firm to their task, finding that as private enterprise could not provide, at a reasonable rent, for those dispossessed, they (the Corporation) would do so.

The total cost of the work of demolition, and of the dwellings which have been provided by the Corporation, including Victoria Square and Juvenal Dwellings, is about £789,000, which entails an annual cost to the rates of about £28,639 after allowing for rents received. This is equal to a rate of about twopence in the pound. Of this amount I estimate that the loss of providing for the dispossessed amounts to over £6,000 per annum, which is equal to something less than a halfpenny in the pound.

This includes not only interest on the loans but the sinking fund for the same, so that at the end of the various periods for which the loans for buildings are granted, and which vary from thirty to sixty years, the ratepayers will have a valuable asset in the shape of rent-producing property.

I think it is generally conceded that this is a wise expenditure of a

municipality which has already expended large amounts in the shape of providing baths, parks, libraries, &c., for the benefit of the people. On the general results of the work I can speak with great confidence. In all works of this nature it is impossible at once to change the condition of those who have been born and brought up in the houses which have been demolished, but I cannot but think that the children who are now living, and those yet to be born, in the Corporation dwellings will not be content to live in the same condition in which their parents previously lived, but will demand something of at least as high a standard as the dwellings which the city are now supplying. Works of this nature must be gradual, and we must not be disappointed if we get an occasional rebuff.

In conclusion, I should reply to a criticism frequently made to the effect that these dwellings are erected too near the heart of the City, and that it would be better to move those who are dispossessed at once to the outskirts. Those who make remarks of this nature can hardly be aware of the conditions prevailing in the great labour mart of this City, namely, the Docks. Here the work is practically all casual. It must also be understood that employment is very irregular, and I should think that on the whole many men are only able to obtain work for three days per week; but notwithstanding this they must be constantly in attendance if they are desirous of obtaining work. Labour is engaged four times in the twenty-four hours, twice for the day work and twice for the night work, and it would be impossible for any tenant who worked at the Docks to go to the outskirts for a meal and come back so as to take his chance of being employed when labour was next required. They have neither the time nor the money to do this. Porters earn from 4s. 6d. to 5s. a day, while stevedores earn at least 5s. a day.

As the greater part of the insanitary property which is dealt with by the Corporation is tenanted by persons who subsist on these earnings, and who obtain their living by this casual labour, it will be seen that the condition of the housing problem which has to be faced in Liverpool is substantially different from that which prevails in many other cities and towns.

A day may come when the operations of the Housing Committee may go further afield, but I feel that for years to come, at any rate, Bournevilles, Port Sunlights, and Garden Cities are not within the range of practical politics in Liverpool, at any rate, for the housing of the very poorest of the population.

The following is a summary of all the dwellings erected by the Corporation of Liverpool :—

	Room.	Rooms.	Three Rooms.	Four Rooms.			Cost of Buildings.		
							£ s. d.	£ s. d	
DWELLINGS COMPLETED, viz.:									
St. Martin's Cottages 1869	...	72	36	*16	*316	*124	17,928 16 0	1,135 2 4	* Including Caretaker's house, &c.
Victoria Square 1885	21	162	86	...	*610	*270 and 12 Shops	68,077 6 1	3,035 0 0	* Including Supt.'s house, office, &c
Juvenal Dwellings 1891	45	53	3	...	160	101 and 1 Shop	16,166 7 11	878 17 0	
RESERVED FOR DISPOSSESSED TENANTS ONLY, VIZ.:									
Arley Street.........1897, 1902/3	...	24	22	...	114	46	7,582 16 5	580 9 0	
Gildart's Gardens Area— (Old) 1897	...	86	2	...	178	88 }	37,551 0 9	652 12 0	
" " (New) 1904	31	22	79	9	348	141 }		*1,330 15 4	* Including Caretaker's house.
Dryden Street 1901	...	160	16	6	392	182	30,191 14 0	*1,579 14 4	* Including Caretaker's house.
Kempston Street, &c. 1902	...	38	(a)30	11	210	79	*17,425 6 0	(a) 846 10 4	* Building only. Land subject to ground rent. (a) Including Caretaker's house.
Kew Street, &c.............1902/3	...	70	34	*10	282	114	22,301 13 3	*1,103 18 4	* Including Caretaker's house.
Adlington Street Area...1902/4	48	70	135	18	*671	*272	48,249 1 6	2,751 10 0	* Including Superintendent's house.
Stanhope Cottages 1904	20	8	20	12	144	60	13,963 13 5	*542 6 4	* Including Caretaker's house.
Mill Street.....................1904	19	6	15	15	136	55	13,278 19 3	542 15 0	
Hornby Street Area 1904	...	50	68	20	384	138 and 2 Shops	30,236 15 7	1,450 3 0	
Clive St. and Shelley St...1905	...	18	*24	...	108	42	(a)9,126 0 0	*422 10 0	* Including Caretaker's house. (a) Estimates only. Accounts not yet made up.
DWELLINGS IN COURSE OF ERECTION:									
Clive Street and Shelley Street	...	18	12	12	120	42	...	585 0 0 approximate	
Upper Mann Street	...	27	18	9	144	54	...	510 0 0 approximate	
Eldon Street	...	...	12	...	36	12	...	125 0 0 approximate	
DWELLINGS IN CONTEMPLATION:									
Hornby Street Area..............	12	75	189	30	849	306 and 5 Shops, also Keeper's House (5 rooms)	...	3,120 0 0 approximate	
Upper Mann Street	...	9	22	3	96	34	...	328 7 0 approximate	
GRAND TOTAL	196	968	823	171	5,298	*2,160		£21,520 10 0	

* Including Two Superintendents' Houses, Offices, &c.

The Chairman (Sir Francis Sharp Powell, Bart., M.P.) expressed his gratification at being present once again in that building, where he had the pleasure, in his capacity as President for the year, of presiding some years ago, over the Congress of The Royal Sanitary Institute. The years which had elapsed since then had been eventful years, and the period on the whole had shown satisfactory progress. A great reform in our vaccination laws had taken place. Many of the difficulties which then attended vaccination had disappeared, and he believed they were entitled to say that the laws and administration of those laws were now in a far more sound and satisfactory state than they were when they last met here. Another department in which great improvements had been made was that of housing and rehousing the people. He was by no means certain that a stage had not been arrived at in the history of rehousing, when it rather fell within the duty of the administrator than of the legislator. He thought the temptation to make speeches rather than act had become a hindrance to the cause of housing, and that much of the energy spent in expressing opinions might be more wisely expended in practical action. If there was to be sound progress in the housing of the people there must be genuine, hearty, and intelligent co-operation between the architect, the physician, and the inhabitant. The houses which they built would be little better in the course of a few years than those which had preceded them, unless the physician was there with his lessons of science, and unless the friendly health visitor was present with her kindly assistance and intelligent suggestion. In some districts where the houses had been carefully built they found them already falling into neglect, and it was only by diligence and perseverance that these insanitary conditions could be cured, and he did not think they could press that lesson too continually or pertinaciously. Ultimately, after the architect had laboured and the physician had taught, it was upon those who lived in these houses that their healthy conditions must depend. He believed the residents were becoming more alive to this necessity. Much had been said as to the dispersing of the people. Difficulties of locomotion were less than they had been, and what he desired to see was the scattering of the inhabitants by trams and other means of locomotion, and thus preventing the heaping up of the people.

Mr. John Morris (Deputy-Chairman of the Liverpool Housing Committee) formally welcomed the Institute to the city. He said he felt sure that the visitors would find much in Liverpool that would interest them in connection with the housing and rehousing question. A great deal had already been accomplished in Liverpool in the direction indicated, but there were still between 8,000 and 9,000 more slum dwellings to deal with. They were, however, encouraged by the results of the work already done, not only in housing the poor, but in raising them in the standard of morality and social life.

COUNCILLOR J. ROBY (Chairman, Dwellings Sub-Committee; Liverpool) joined in welcoming the members of the Institute, and, referring to the able and interesting paper of Mr. Turton, said there were happy places in the United Kingdom where there was no housing question; other places had no insanitary areas to be dealt with, and their only problem was a scarcity of houses for working classes who were able and willing to pay a reasonable rent for a reasonable house. Others, again, had no insanitary areas, but had to provide for a working-class population who had not the means to pay a reasonable rent, while other places, of which Liverpool was a type, had very expensive insanitary areas to be demolished, and had also to rehouse a working-class population who had irregular work and insufficient wages. He emphasized the absolute necessity of rehousing these people upon the same expensive areas where they had formerly lived, and instanced the remark of a working man to him once as to the impossibility of expecting a man employed at the docks to leave a house in the suburbs at, say 2 a.m., to walk three or four miles to the docks to await that state of the tide when he might expect, not work, but merely the chance of being selected from among others to obtain work, when if not engaged he would have to walk home to snatch a short rest, and again walk down to the docks in quest of work. He took the keynote of Mr. Turton's paper to be the necessity of rehousing such people as these in close proximity to the docks, and the main difficulty was the financial one. If insanitary areas could be demolished and the poor rehoused so as to make an annual return of ten per cent. on the outlay there would be very soon no housing question, as the more the areas that were dealt with, and the greater the numbers of poor who were rehoused, the greater the profit to the local authority. Unfortunately, the return was necessarily one which involved an annual loss to the ratepayers, hence the whole difficulty. Other difficulties were that these poor people who had lived in the centre of the city had each their own parish to which they belonged, with church and schools, and would not leave those parishes, nor would they from pure love of town life leave the centre of the city.

DR. BERRY (Wigan) said that Liverpool was certainly grappling with what proved to be, in most towns, a very difficult subject. In his own town, Wigan, they had done a great deal by way of demolishing insanitary property during a period of five years. From 1896 to 1900 they had demolished something like 500 houses under Part II. of the Housing of the Working Classes Act 1890; this meant displacing something like 2,000 tenants, or probably a little more than this. Since 1901 they had not demolished insanitary property at the same rate, for the simple reason that there was no accommodation available for the class of tenants which occupied these houses. The great difficulty was finding, by private enterprise or otherwise, houses of a rental such as the displaced people could afford to pay. This class of tenant was only able to pay from 2s. 6d. to 4s. per week as rent, and it had been mentioned by Mr. Turton their earnings

averaged from 10s. to 15s. per week; the consequence was these people were driven to adjoining districts to make other slum dwellings, or they crowded into other houses, two or three families into one house, thus making through houses into back houses and causing overcrowding. The Corporation now, however, were building cottages for this class of tenant; the cottages were to have a rental of 4s. a week each. The Corporation of Wigan dealt with two or three insanitary areas in the town under Part I. of the Act, and these areas were very expensive; the regulations laid down by the Local Government Board to build houses on them were such that the class of house commanded a rental of 5s. to 5s. 9d. a week, which the displaced tenant could not afford to pay. The houses so well built were required also to be disposed of by auction within ten years; this resulted in a loss to the town of something like £50 per house. In the demolishing of houses under Part II. of the Act they had not had much difficulty with the owners. Owing to the power of a Local Improvement Bill they were enabled to pay a certain sum as compensation calculated on the rateable value of the houses. He had only had to take action against one owner, and here the architect stepped in with a knowledge the medical officer of health did not possess. There were three houses; the middle one was cut out, the cellars filled up, and to make through ventilation he was able to put the back door at the side and give enough yard space. He was pleased to see that in Liverpool they had been able to get sixty years for the repayment of the loan for the erection of buildings instead of thirty years. The death-rate in the new dwellings could not be expected to diminish all at once on account of the class of people who had occupied the slum dwellings. They must also remember that the concentration of people on a confined area was not conducive to a low death-rate. People, as the Chairman had remarked, had benefited when it was possible to carry them to the outskirts of the town. There would, however, always be the desire that they should live as close to their work as possible. As an example of the effects of concentration, he might state that there had been recently added to his district an adjoining parish of a similar acreage, and that the population in round numbers was 25,000, whereas they had on a similar acreage 64,000. The work, habits, and associations of the two were the same, yet the annual death-rate amongst the smaller population was less than their own, although they might say the sanitary arrangements were not up to the same level.

Dr. Arnold Evans (Bradford) considered that the Liverpool Corporation had done great work in the rehousing of dispossessed tenants; in fact, with the exception of the London County Council, he knew of no municipality in the country that had made so serious and so successful an attempt to deal with the housing of the poor as had the Liverpool Corporation, and he recommended other corporations, who contemplated action in the housing of the poor, to

inspect the work carried out by the Corporation of Liverpool. Dr. Evans expressed the opinion that no scheme of rehousing could be regarded as completely successful, unless it provided accommodation for those of every class who were displaced. He knew that it was difficult to provide decent accommodation for the very poor, but until tenements of two or three rooms for some of the poorest families had been provided at a rent of about 2s. 6d. or 3s. per week, it could not be contended that every class had been adequately treated. There were, however, almost insuperable difficulties in the way of rehousing; for instance, in Bradford, although houses at a rental of 4s. 6d. per week had been provided for the purpose of rehousing a population of about 1,300, yet it was not possible to persuade any of the displaced population to live in the new houses provided for them.

MR. ALFRED M. FOWLER (Manchester) said that his experience did not go to the ideal through-dwellings in preference to the back-to-back house, to the extent of some advocates. It was well to say: "Clear away the rookeries of back-to-back houses and build blocks of artizans' dwellings." He was with those advocates for clearing away crowded areas with pent-up yards, courts, and passages. The idea, however, of building modern back-to-back houses should not be misunderstood. He had heard discussions in public meetings, assembled from time to time, and gathered there were but few who knew what a modern back-to-back house was. The great argument was ventilation, a through current of air, sunlight, open spaces, and a minimum population in a maximum area. These essentials, to the best advantage, were not secured in blocks of artizan dwellings, six or seven storeys in height. Surely, these were more worthy of the name of "rookeries" than a self-contained house with a ground and first floor? When was ventilation of the dwelling-house most required? He said during the night-time. And he contended this was not secured in a block of dwellings with the occupants piled up some six storeys in rooms of the smallest possible dimensions. Ventilation was not so much in demand during the day-time, the working classes were then following their employment, and the children out of doors. Compare that state of things, say for a period of eight hours of the twenty-four, when all the doors and windows in this rookery of flats and dwellings, one on top of the other were closed, with a back-to-back house, as at Leeds, for instance, having say four spacious windows, a door to the open air, and an average of four to five individuals (as against twenty-eight to thirty-five) sleeping under one roof. A Leeds working man had his house his castle, with a street, 36 feet wide, in front, well paved and footpath flagged, convenience (in some cases under the front door-steps) outside. Moreover, he had the advantage of the building societies, of which there are several, allowing of living at a very small rent. These societies had been established some eighty years. A workman might invest 3s. or 4s. per week with the society, until the principal with

interest amounted to £40 or £50. He could, through this aid, purchase a house for £160. He would have to continue to pay 3s. per week for, say, twenty-four years in the shape of rent, when the house became his own freehold. If he had to rent it in the ordinary way, he would have to pay 4s. 3d. per week at least. In his opinion the principal curse of the dilapidated dwellings was the long leases system. It was no interest to the lessee to keep brick and mortar in repair, especially when near the termination of the lease. And again, money can be borrowed up to three-fourths the value of freehold property, but only half on leasehold—and that must be on a long lease. When long leases were first instituted, many years ago, there were not so many sources open for the protection of capital as there are now. He contended the time had come when the present state of things should be discontinued, not only for giving facilities to the working man by making the land freehold, but to encourage him to be frugal, to have an interest in the state, and to so invest his money that it could be realized at its full value whenever he required. Not so with leasehold land; for the owner of the bricks and mortar, perhaps placing his "all" on such land, cannot so realise with the same advantage, inasmuch as a land owner set out his estate in the most temporary manner, just sufficient to enable him to let the plots on lease, and when all were sold discarded the roads, leaving the lessees to do as best they could until the Town Council stepped in and made an order to put the roads in proper condition, which should have been done substantially in the first instance by the lessor. The chiefs, or ground rents, were, however, obliged to be paid, and as the Town Council went on improving the environs of the town, the plots unsold went on increasing in value, whilst there was not one penny further expense to the lessor. The Land Values Assessment and Rating Bill now before Parliament aimed to value the land at three per cent. on the selling value of the land, as distinct from the building. So that "the land value alone is to be subject to rateing." At present, they must understand, the ground landlord did not pay municipal rates. The lessee could not acquire (enfranchise) the land except at the option of the lessor, and then only at such capitalised value as he chose, with all the benefit of municipal improvements, such as good roads, free libraries, parks, baths, tramways, etc. It would here be seen that the owner of the building, even if unoccupied, must pay the ground rent, while the landowner was free from paying municipal rates on such amount; whereas, on the enfranchisement of the land being sought to be obtained, the prices required put it out of reach, financially, of the building owner. Land-owners of large estates and large employers of labour should be compelled to set aside a certain area (in proportion to the whole) for the erection of workmen's dwellings. This was essential for the convenience and benefit of employer and employed. And from a monetary consideration it was economical. Many years ago, the Ackroyds, of Halifax; Sir Titus Salt, of Saltaire; the Marshalls, of Leeds; the McClures, of Stockport, and many others provided

cottages within easy distance of their respective works. The Liverpool Docks estate, wealthy as it was, with all its attendant diversity of labour, so intermittent in its demands, had evidently disregarded the importance of making this provision. With much greater force did these remarks apply to Liverpool, when it was known the dock labourers had to wait some time, long intervals, for employment. The poor they had always with them; and in the absence of that provision which they cannot obtain for themselves, the state must ultimately suffer in many ways.

MR. KYFFIN-TAYLOR, (Liverpool), said one of the causes of slums was that many people were not able to pay higher rents than those demanded by slum owners, and the people of inadequate means and the slum house naturally came together. The question of rehousing could not be considered as a separate problem, for it was part and parcel of the problem of employment, and must be considered in relation to the means of those they had to rehouse; so long as there were people living from hand to mouth so long would there be a demand for such insanitary houses as exist. When every insanitary house had been pulled down they would still have to deal with the problem of housing that portion of the community whose means would not enable them to pay an ordinary rent. In the meantime it was essential that the displaced should be rehoused. The Corporation of Liverpool was not obliged to rehouse more than fifty per cent., and it had for many years (as they had just heard) been prepared to house all those turned out of insanitary houses. This matter, however, should not be left to the option of a corporation, which should be compelled to provide dwellings sufficient to rehouse every displaced tenant. The reason was, that if only fifty per cent. of the dispossessed were rehoused the other fifty per cent. either went into other insanitary houses, or went into houses which they made insanitary by permanent neglect, assisted most probably by defective construction. If it was really desired to rehouse all the dispossessed, it was essential that the corporation dwellings should be offered to them at rentals well within their means. It was absurd to turn out of an insanitary house, for which they had been paying 3s. 6d. a week, a family of six people, and expect them willingly to go into a better one at an increased rent. It was not always a man's own fault that he was not able to earn sufficient to enable him to obtain reasonable house-room. The earnings of this class were on the average about 15s. per week, and if, as had often been suggested, a man's rent should not exceed a sixth part of his earnings, then it was obvious they could not charge him very much. The subject of rent was a difficult one, and conflicting views were held concerning the question whether the corporation should or should not expect a reasonable return for its outlay. But he was entirely opposed to any view which would regard rehousing as a commercial speculation only. Accordingly, although the rents alluded to by Mr. Turton as being those fixed for the dwellings in

Hornby Street were moderate when compared with ordinary dwellings, yet they were rather high for the class of people for whose benefit they had been erected; and if the loss, so far as concerns rehousing, was not much more than £6,000 per annum, he thought these rents might well be somewhat reduced. On this point he might remind them that Mr. Turton had told them that in Hornby Street it was found that seventy-one per cent. were rehoused, and he was hopeful enough to believe that if the rents were but slightly reduced a substantial portion of the remaining twenty-nine per cent. would be rehoused. This would add to the financial benefit accruing to the community, and perhaps more than make up for the reduction in rent; for according to the amazing statistics they had just heard, the more they rehoused the more drunkenness would decrease, fewer police would be required, fewer crimes would be committed, fewer people would go to gaol, and the health of the entire community would be greatly improved. These people were turned out of their houses (and these houses were pulled down), not for their own benefit, but for the benefit of the whole community, and with the idea that as soon as possible all the inhabitants of the town should live under conditions fostering their physical, mental, and moral qualities. The corporation did not grudge a vast expenditure in providing wash-houses, swimming baths, parks, libraries, art galleries, and so forth, and would not, he was sure, grudge the expenditure of equally large sums of money in so improving housing conditions as to bring pure air, open spaces, playgrounds, and healthy dwellings within the reach of all its inhabitants. Another important matter in connection with rehousing was, where were the dispossessed to be rehoused? He had no doubt that there was a strong desire on the part of most of the people turned out of their dwellings to remain in close proximity to where they had been accustomed to live, principally because they labour in some factory close by, and to some extent it was necessary to rehouse these people in the neighbourhood of their former insanitary houses. He would like to say a word as to the residue of people referred to by Mr. Turton, and it was this: that if their unfortunate position was due primarily to want of employment, if they have learned to shirk work through being obliged to be idle, then they were entitled to sympathy; and our destruction of insanitary houses and closing of cellar dwellings amounts, as affecting this class, to little short of cruelty, for they would not live in the workhouse. Lastly, he thought that the time had come that the working classes should benefit from and have a share in the credit of the municipality, which should be empowered to build small dwelling-houses for the working classes. This could be done under the Small Dwellings Acquisition Act, which enabled a man to become the owner of his own house by enabling the corporation to lend him four-fifths of its value. With respect to this Act, the corporation might very well arrange with a builder that it would assist him to sell his houses by agreeing to lend on loan four-fifths of the value of any house erected in accordance with the requirements of the corporation. It might be said

that for the corporation to build dwellings for the working classes was unnecessary, and that there was no demand for them; but he was sure that there was a demand, and they had heard of it that morning. He thought that such demand had arisen owing to the increasing acquaintance of the working classes with the corporation dwellings already erected, and the day was not far distant when the working men would demand that they who had not been turned out of insanitary houses should be allowed to inhabit houses equally as good as those who had been turned out; and as, from a social point of view, the value of having large numbers of the working classes occupying their own dwellings is very great, everything should be done to assist the working classes to become the owners of the houses inhabited by them. If builders would supply the demand for well-built dwellings at a moderate rent there would be no need for the exercise of these powers; but if it was proved that a sufficient supply of such dwellings was not forthcoming except at high rents, and that they are not for sale except at an exorbitant cost, then the municipality should build what was required.

COUNCILLOR E. RUSSELL TAYLOR (Liverpool) said the work, as carried out in Liverpool, created a new type of civilization, which had in turn created new conditions of life, a new environment which concerned us all; and the advantages and blessings conferred upon these dispossessed people were not only perceptible but also immeasurable, and he congratulated their city upon having an authority courageous enough to spend thousands of pounds in affording opportunities for the very poor to enjoy a house provided with light, air, and water—the essentials of health; for do not let them forget that the "true wealth of a nation depends upon the health of its citizens." Even if this work entailed a deficit, the lowered death-rate in itself justified the expense; then, too, an improved vitality, a higher standard of morality, and greater contentment on the part of the city's submerged tenth, meant in turn a less expenditure for the ratepayers in the great departments of health, charity, and police. What an object-lesson was afforded to them by the old and the new dwellings. Side by side within a very limited area they found a newly implanted population finding in their new abodes the necessary requisites to healthy living, the necessary requirements to enable them to live more moral lives, and above all, they found the children could be reared in a manner unfortunately unknown to them before, and which would give them the true stamp of manhood and womanhood: whilst in the old insanitary property they found the population retained to the last those characteristics which they were so anxious to amend. But there was another question: were they by the plan and design of the houses now being erected around their cities and by the general development creating slums of the future? And it was as frequently asserted not with the caution one would expect, and he was afraid, not only by individuals but also by associations, that such was the case.

The causes of slumland were well known, and he might be permitted to remind them that in Liverpool there were many. Some were:—(1) migration from Ireland during the famine, when thousands came to and remained in Liverpool, many of whom were housed by persons erecting small and cramped tenements at the rear of existing houses, creating the courts and alleys of to-day; (2) the dock labourers who are willing to work, but owing to the intermittent nature of their employment find it difficult to earn more than 15s. per week, and as the exigencies of their work demand they should live near the docks: the result is they overcrowd; (3) the class that have not and will not work; (4) the influx, during late years particularly, of the agricultural labourer, who, leaving the land, comes into our city with the object of bettering his condition, but who unfortunately in too many instances helps to swell the great army of unemployed. But times and conditions were changed now. The property is built under stringent rules and regulations, and upon the most hygienic principles; thorough ventilation is required for every room; allotted space at the rear of each house is also required; the roads in front are of specified widths deemed sufficient to-day, and which are paved and flagged; and all this done under experienced inspectors. He failed to appreciate how they could become slums; but as one anxious to meet present emergencies, and equally anxious to look forward to prevent, if possible, preventable evils, he should like to ask: what else could be done? What was the alternative remedy to meet the pressing demands of a rapidly increasing population? The more he had contemplated this question, the more it seemed to him that the policy they were pursuing in Liverpool, based upon experience, was the right and proper one, and would ultimately tend to the solution of this great social question, for, to his mind, the schemes of garden cities had not been brought within the range of practicability; and he believed by a continued efficient co-operation, it was possible to realise the scheme outlined.

DR. R. SYDNEY MARSDEN (Birkenhead) said a previous speaker had stated that "he would not regard the rehousing of dispossessed tenants as a commercial speculation;" but he would find when he came to deal with the problem practically that the commercial element could not be eliminated. There was a limit to the capacity for laying out unremunerative capital from the pockets of the ratepayers, however worthy the objects for which it was to be used might be, and the great movement now taking place all over the country with regard to the growing magnitude of the rates showed that the question was becoming a national one, and that the limit for unremunerative expenditure was rapidly being reached. Under these circumstances it was becoming a question as to how they could get the greatest value out of the available funds. In his own experience he had found that there was a very general complaint among the dispossessed that the new houses erected by municipalities, with their concrete floors and impervious surfaces, were too cold and over-ventilated, and one com-

very well understand the complaint if they considered the small amount of coal and heat-producing material which persons whose capacity for paying rent did not exceed 2s. 6d. to 3s. per week would possess. He had often thought that if, in building blocks of new houses under these rehousing schemes, some method of producing a central source of heating could be provided, it would be a great advantage. He meant that if a supply from a central boiler of hot water for washing and cooking purposes, for heating the rooms, and for the supply of baths in connection with such houses to the tenants at very little if any above cost price, and supplied either at the rate of a few pence per week on the rent, or by some penny-in-the-slot arrangement, could be provided, it would go a long way towards helping the very poor towards obtaining warmth and cleanliness at a minimum cost. The objection would no doubt be raised that this class of person does not like washing, and did not use the baths which were at one time provided in the houses for their convenience; but the objection was not a valid one, as having no means of producing hot water for their baths except by a small kettle on a small fire, made from coal bought at relatively high prices owing to its being bought in small quantities, they naturally gave up the attempt on a first trial. But the experience of warm baths provided in common lodging houses, where the man could have a warm bath for a penny or twopence and a towel provided, showed that very large numbers availed themselves of the facilities, and that many of the very poor at least preferred being clean to being dirty, if the means of being so came within their powers of expenditure. Something had been said with regard to the healthiness of back-to-back houses as they exist at Leeds, and comparative death-rates for Leeds and Liverpool had been given. He was not prepared to go into this big question there, but would just remark that his own experience showed that whilst a solid backed house which faced south or west, with a good open space in front which permitted the rooms to be flooded with sunlight, might not be very objectionable, yet any such house which faced north or north-east, and was thus debarred from direct sunlight, was objectionable and detrimental to health. He would also call attention to the fact that in dealing with comparative death-rates it must not be forgotten that as they moved from west to east the general death-rates decreased, from north-east to south-east they still diminished, from south-east to south-west there was a slight increase, and as they went up the west coast from south-west to north-west the death-rates gradually became higher, not forgetting that density of population must also be allowed for.

MISS LIMONT (Burnley) expressed the pleasure it had given her to hear the importance Sir Francis Powell attached to the work of the lady inspector in preventing tenants who had been rehoused in new property from falling back into old habits, and so speedily rendering their new homes almost as insanitary as those from which they had been removed. He had pointed out that after

the architect and the physician had done their utmost for structural suitability, it remained for the tenant, under the constant supervision of the inspector—almost certainly the *lady* inspector; to maintain the dwellings in a cleanly state, so that the benefits arising from the new and better conditions should not be nullified. The Corporation of Burnley were strongly impressed with this idea, as evidenced by the fact that they had sent her as their representative to that meeting. She had great sympathy with the speaker, who, in advocating a central system of heating, spoke of the dislike of the poor for cold or airy houses. As a Health Inspector a considerable portion of her time was taken up in inducing Burnley housewives to remove the sheet of brown paper, so neatly pasted over the fireplace of each bedroom. It was interesting to hear from Dr. Marsden the theory of a declining death-rate as one advanced across Great Britain from the west towards the east. This must be specially gratifying to the Health Authorities of Edinburgh, who endured the grief and chagrin of having a higher death-rate than Leith. They could now be comforted in knowing that this was inevitable; that Leith owed its lower death-rate to the fact that it lay one and a half miles to the east.

Mr. Turton, in reply, stated that he claimed no more for his paper than that it was a restricted view of the housing question, a question the oftener one looked into it the more complicated it seemed to become. He had grave doubts whether any scheme for rehousing the dispossessed could be made to pay, and he could not see that it was a financial question at all, any more than the provision of parks, baths, or libraries was. He emphasised what he had endeavoured to bring out in his paper that the improvement in the home had produced a great moral effect upon the tenants, and that the great bulk of them appeared to have lived up to the new conditions of their habitations. He could not agree with what Mr. Fowler had said as to the want of through ventilation in tenement houses, and thought that after Mr. Fowler had inspected the tenements erected by the Corporation he might modify his views. He also desired to mention that in his paper he had omitted to point out that the rents charged included rates, taxes, water, and all outgoings except gas, which was supplied at the cost of the tenants by means of penny-in-the-slot meters. He had listened with considerable interest to what Dr. Marsden had said about the benefits of hot water, and pointed out that in one of the blocks of dwellings in Dryden Street, hot water was provided and supplied from a common centre, and was greatly appreciated by the tenants; but the cost, which he estimated to be fourpence per tenement per week, made it almost prohibitive.

DISCUSSION ON

HOUSING IN MANSIONS LET AS FLATS.

Opened by LOUIS C. PARKES, M.D., D.P.H.,
Medical Officer of Health for the Metropolitan Borough of Chelsea, and Consulting Sanitary Adviser to H.M. Office of Works and to the Metropolitan Police.

(FELLOW.)

And W. ROLFE (Architect),

At Sessional Meeting, London, May 8th, 1905.

DR. LOUIS C. PARKES.

OWING to the increased value of land in nearly all parts of the metropolis, and the heavy ground rents now exacted, small buildings housing comparatively few persons are no longer remunerative, and cleared land is being covered with large buildings of high rental value. Only a few very wealthy people can afford to occupy large single mansions with high ground rents, so that it is now becoming more the custom with estate companies and builders to erect blocks of mansions let in flats, which provide accommodation in parallel layers for separate families, so that a high density of population is obtained, and the cost of the land and building is distributed amongst a large number of tenants.

These flats, at the best, supply only a limited amount of accommodation, and are suitable for small families; but owing to the reduction in the birth-rate amongst the middle and upper classes, as compared with what prevailed in early Victorian times, small families amongst these classes are now rather the rule than the exception, and in consequence flats supply the kind of house accommodation which is most in demand. The effect of the lowered birth-rate is seen also amongst the lower middle classes and amongst the higher grades of the working class population, for industrial

and municipal dwellings make practically little or no provision for large families, and yet the demand for tenancies in block dwellings is largely in excess of the supply.

In Chelsea, of which I am the medical officer of health, the Borough Council has recently erected five blocks of dwellings for artizans, or industrial dwellings, and they have been taken up very quickly. No sooner were the dwellings ready than they were occupied by tenants, and now there is no accommodation available. Hundreds of people have put down their names to come in. These only contain rooms for quite small families. The large tenements only contain three rooms, providing accommodation for five or six persons. I think that shows how very largely now small tenements are required for persons of the working class having small families.

There can be no doubt, then, that an increasing proportion of the metropolitan population is living under circumstances of somewhat close crowding, combined with limited accommodation; but this is not principally because these people are obliged to live under these conditions, there being no other kind of house available, but because the conditions of society are altering, and the flat mode of living complies with the altered conditions. How far the increased costs of land and building are factors, and possibly important factors, in the production of a lower birth-rate and the limitation of the size of families is another matter, and its discussion would require a large amount of time. My own impression is that the two subjects are very intimately connected, and that the failure of the central portions of London to increase in population by excess of births over deaths, which has been a conspicuous feature of the recent census enumerations, is largely affected by the increasing pressure of rentals.

Density of population on area was thought by the late Dr. Farr and other early pioneers of vital statistics to be an essential cause of unhealthy conditions and of a high death-rate. At the time of Dr. Farr's writings it probably was so; but now, with the great advances that have been made in the science of domestic sanitation, it is found possible to house large numbers on a small area under perfectly healthy conditions (so far as such conditions are obtainable under the circumstances of urban life) that would have appeared incredible to the early observers. Industrial dwellings for the working classes house people at the rate of 1,000 per acre, and yet their death-rates are actually lower than those of people of the same class who live in the ordinary two- or three-story tenement houses, where the density of population is very much less. An equal amount of crowding is probably to be found in many of the blocks of residential mansions

for the middle classes, which are now so evident in all parts of London, and so far there is no record of such habitations being unhealthy.

It is probably too early as yet to accept without qualification the statement that crowding has no effect on the health and life of the crowded population. There may be tendencies amongst these people towards slowly advancing degenerative changes, which, at present imperceptible, may appear not in this but in subsequent generations; so that generalisations, in the absence of sufficiently extended observations, should be avoided.

Apart from the question of crowding, the aspects of flat life that are most suggestive of unwholesome influences are those arising from the necessity, in the erection of this class of dwellings, of constructing enclosed areas or courtyards from which the inner rooms derive all their light and air supply. These inner rooms are very largely utilised as servants' offices and bedrooms, whilst the rooms facing streets or other open spaces are the living rooms and bedrooms of the tenant and his family. The air of these courtyards and shafts is sunless and stagnant, and it might be supposed that the occupants of these rooms are not living even under such good hygienic conditions as prevail in the ordinary London single house, where the servants' offices are in the basement, and their bedrooms in the attics. My observation, however, leads me to believe that the unhealthy conditions appertaining to these shut-in rooms of flats are to some extent mitigated by the fact that the windows of the rooms are much more commonly kept open, even in cold weather, by the servants who occupy them, than in the case of the ordinary London house. The necessity for air is no doubt felt; and as the wind is prevented from blowing directly in, there is less fear of cold currents and draught than in the case of rooms with windows facing directly into large open spaces. A very serious disadvantage of the stagnant air supply is that odours escaping from dust-bins placed at the bottom of the shaft, and vapours from cooking and cleansing operations carried on in the rooms looking into the shaft or courtyard, tend to diffuse themselves and penetrate into all the rooms above the point at which the smells are evolved, with the result that there is always a taint in the air, and the air is never really fresh. I believe that domestic servants are not, as a class, particularly enamoured of service in flats. They are more isolated from the external world than in the ordinary London house, and life is no doubt duller; but the life in rooms which have no view except a blank wall a few feet away, which have an air supply which is not always pleasant to smell and is never really fresh, and in which there is a deficiency of day-light, meaning long

hours daily of artificial light from November to March, is not exactly life under ideal conditions; and it is not to be wondered at that men and women, who have spent their early life in country cottages or small suburban houses, are averse to domestic service under such conditions.

The occupiers of flats (the tenant and his family) are usually free from the depressing conditions which are considered sufficiently good for the servants. Most of the rooms they occupy are light and well ventilated, as they occupy the external positions on the more important front and back faces of the building. The rooms are found to be warm and of equable temperature in winter, as the walls are warmed by the number of flues running up them from the various flats; in summer, the size of the building and the thickness of the walls prevent undue heating by the rays of the sun, unless the flat happens to be in the roof. There is a considerable saving of energy in having all the rooms on one level, and there are no staircase and landings to clean, so that fewer servants are necessary in a flat than in an ordinary house. The tenant of a flat has also other advantages. He can go away and shut his flat up, leaving it in the care of the hall-porter; and, as he pays rates and taxes in a lump sum with his rent, he is saved the bother of attending to a number of small demands from rating authorities, and he can view with equanimity the colossal rise in the rates of his borough, at any rate until the termination of his lease, when he commences negotiations with his landlord for a renewal.

From the public point of view there is perhaps another aspect to this question, as there can be no doubt that the apathy of the London public in regard to the increase of rates is greatly due to the fact that large masses of the population never really feel the direct pressure of the rates. They are either working-class people who pay rates as part of their rent to the landlords of the tenements they live in, the landlords of this class of property compounding for the rates and getting a reduction from the local authorities, who find it better to give a discount to the landlords and so save themselves the burden of collection from the individual occupiers of tenements; or else they are people who live in flats and have leases or agreements with the owners of the mansions they live in, which prevent them from troubling about rates so long as the leases or agreements are in force. If a new law was passed requiring every occupier to pay rates direct to the rating authority, and rendering illegal the compounding for rates by owners of tenement property, a more effectual step towards economy in municipal expenditure would have been taken than all the outcry in the public press and the speeches of social economists in or out of Parliament amount to.

We may conclude, then, that if flats are an evil they appear to be a necessary evil, their growth in London being dependent upon the increase in the value of land in nearly all residential districts. It is a somewhat curious consideration that the growth and improvement of yet another modern luxury, the motor-car, will probably be effective in time in providing an antidote for the continually ascending price of land. When people can travel at great speed and with every comfort from distant parts of Surrey, Middlesex, Essex, and Kent into the centre of London, can transact their business and their pleasure in London, and return home again in the same time as it now takes an omnibus to travel from the Bank to the Marble Arch, the attractions of the West-end will be considerably diminished as a residential neighbourhood. Already there are signs of this latest development in the fact that West-end houses are becoming more and more difficult to let for the London season, because the wealthy classes prefer to take houses in the country around London, where they have week-end house parties, and from which they can visit London in their motor-cars, with as much ease as if they lived in Belgravia. With private motor-cars for the wealthy and prosperous classes, and with electric railways, tube railways, electric trams, and motor-omnibuses for the ordinary citizen, who will care to live in central London, with its enervating smoke-laden atmosphere, and its perpetual noise, rattle, and worry? Cheap and rapid transit from the periphery to the centre is the key to the housing problem, whether of rich or poor; and the inflated price of London's surface area must give way before the advance in the science of rapid transit, of which we are witnessing the dawning era.

One other matter I may refer to:—the question whether infectious diseases are more prevalent amongst people living closely together in flats and industrial dwellings than among people living under ordinary conditions in single houses. I am bound to say I think they are not. Attention has been given to this matter by several people besides myself, and I do not think there is any evidence to show that the ordinary infectious diseases, such as scarlet fever, measles, whooping cough, diphtheria, enteric fever, or any other infectious diseases are more prevalent because people happen to be rather crowded together. It might be thought that with people living on a common staircase that a number of families might be infected perhaps by one tenant having measles in his family on the lowest floor, and that the infection might travel up the staircase and so infect other tenements. But it does not appear to be so, and it is probable that infection travels very much less by means of infected air in that way than was originally supposed. At any rate, so

far I am able to say I do not see any reason to believe that infectious diseases are at all increased in prevalence or fatality by reason of people living on crowded areas in industrial dwellings or in residential flats.

W. ROLFE (Architect).

THE subject for discussion, "Housing in Mansions let as Flats," which I am privileged to bring before you this evening in the form of some notes, concerns a gradual development of this class of building during the past 30 years; not carried out systematically, as in Paris or Berlin, and certainly not with the rapid growth of New York, but rather by the adaptation of sites from time to time as separate buildings, and not built in sequence in new thoroughfares. Had Wren's or other more recent street arrangements been carried out, London to-day probably would not contain whole streets of this class of buildings.

The question is, does this housing of residents in flats meet a *want*, a want of a proportionate part of those residents who will live in central positions? Are these large blocks likely to retain tenants, not only to-day, but in the near and distant future?

For purposes of this discussion attention may profitably be confined to a radius of, say, one or two miles from Charing Cross; not to the avoidance of such districts as Kensington, but because the wisdom of housing in flats at Hampstead and such places has yet to be proved.

Flats in the best positions should realize rental values of from £800 to £80 per annum. The first should have ample accommodation for servants, and the second accommodation for a single or two persons.

The site for such buildings should be *central.* Many who select such residences keep no conveyance, prefer to be near omnibus, tram, or tube, do not entertain much at home, and regard distance from places of entertainment as an important factor. The number of rooms required is a known quantity, the number of servants, etc.; and this, notwithstanding the drawbacks of musical instruments overhead, the occasional rumble of the lift, or the vibration in these tall buildings from passing heavy traffic.

In the selection of site crowded situations should be avoided, *i.e.*, positions where sufficient outlook, rear space, and middle areas cannot be provided. The value of land and accompanying heavy ground rent in the best positions tend to crowding too much building on a limited site. Positions at the corner of two streets are good; better still where a building fronts on a street and has its rear on an open square or garden. Points

essential to healthy buildings of this class are sunny aspect, good rear space, either garden or an extent equal to height of building, middle courts or areas in full compliance with London Building Act, and with windows of B. P., lavatories, bath-rooms, scullery, larder, etc., but not living-rooms looking on to same.

The main features of flats as residences are a maximum of accommodation in a minimum of space; usually arranged on one level, and the more general plan adopted is that of a suite on each side of the stairway, *i.e.*, two flats on a floor.

The principal entrance to the building should be central, with good hall, which should be carpeted and furnished and have fireplace; this hall should be an important feature, the stairway from same should be wide and well-lighted and carpeted. This is also used for furniture. The decorations of hall and stairway should be suited for wear and of a durable character. The passenger lift, worked by electricity where practicable, should be roomy and with a seat for at least one person, with top light and means of egress at top, fitted with its own closing gate (not door)—lift, when working in well of stairway, should be carefully enclosed, and the entrances at each upper floor should have folding doors or collapsible gates.

The landings of stairs on each floor should be roomy and well-lighted, with space for approaching the lift and the entrance doors of flats; the stairway should be carried right up to roof flat, with door at finish.

The accommodation provided in a flat, which will vary necessarily according to position and rental value, should consist of a hall, large or small, with fireplace and space for furniture, and with outside window; reception rooms of good size, the dining room sufficiently wide to pass round table; corridor leading from hall, with bedrooms off same, one bedroom to be a good one, with good outlook, bath-room and one w.c.; a store and wine cupboard, the kitchen, approached *from its own passage* from hall, or across pantry, in any case provided with swing door, and with outside window looking into open space, and *not into enclosed middle area;* a scullery in some cases, and in others a scullery recess in kitchen; a larder with outside window; a w.c. opening off the passage; a pantry, though small, for washing glass and cleaning plate, which is quite as necessary as scullery.

Certain additional accommodation for servants should be provided in the highly-rented flats, for maids in bedrooms on top story, and for men in the basement story.

The tradesmen should have an approach (as a rule) away from the

principal entrance to the building, with ready access to goods lift, and with speaking tubes to each flat, not a back stairs, which is a nuisance in most cases, and only a necessity in few cases; the goods lift should be worked by electricity, and strong enough to move half a hundredweight.

The system of drainage should provide that where practicable all pipes are accommodated in the middle area or side areas, with free access to foot of each pipe, connections from same to manhole or manholes, and thence direct to sewer, opportunities for cleaning and flushing at all points, and all vertical pipes carried upright above roof, scullery wastes in particular.

Apart from other reasons of objection to flats over shops, there is great difficulty in providing good drainage; in such cases the basement of the building should belong to flats, and not to shops.

Glazed stoneware pipes in concrete should be used in preference to iron pipes, interior of manholes should be of glazed ware, traps at foot of scullery and bath wastes should be small, with ample opportunity for frequent cleansing.

Dustbins, of galvanized iron, fitted with covers, should be kept in the open air, and dry refuse should be separated from the wet; both should be burned or frequently removed.

The fireplaces in a flat are usually too large and rooms overheated in consequence, they should be provided with blowers and fresh-air intakes, and good close-fitting registers to counteract the trouble of downdraught and back smoke.

The windows of rooms in all cases should have the head as near the ceiling as possible, sashes are to be preferred as best for ventilation and cleaning, but special ventilators into separate flues are doubtful, as the fog is drawn down same.

The construction of floors should be of concrete encasing the steel joists, with a space between underside of concrete and plaster ceiling, and a space between upper side of concrete and wood floor. The points are to secure fire-resisting and soundproof construction.

The fire-escape stairs should be *solid*, and formed as part of the building, open iron stairs are used, but are questionable in case of panic.

Some of the details which assist in the comfortable working of this class of building are the proper "calls" from each flat to the entrance hall, etc.—including the telephone, the proper installation of bell and electric wires; the providing of access to all main pipes and wires, usually on or near the stairway, the use of white glazed material for areas and as wall linings to kitchen, pantry, and lavatories, not omitting the careful selection of decorations to assist the light of the rooms as well as decorate them.

It is rather difficult, in offering a few notes as to the arrangement of a building, to cover the ground sufficiently, because there are so many varieties of flats. I have confined my remarks to those within a radius of two miles of Charing Cross, because it is doubtful whether the flats at Hampstead or Hammersmith, and other similar districts, will not go empty. I think they have been overbuilt already. But flats in central positions are better fitted to suit the wants of those who choose to live in flats, and they will continue to live in them in central positions, provided the accommodation is good. But I should say there are some five out of seven buildings of flats in London that should not have been built at all. I do not think the tenancies of them will keep up. The fault has been that directly a piece of land has become vacant or an estate at liberty, it has been the custom to say, "Oh, that will do for flats," so that although there has not been exactly a fashion in flats, there has been a tendency among builders to put flats almost anywhere.

DR. J. F. J. SYKES (St. Pancras) said he agreed with Dr. Parkes in his description of the class of family that ought to live in flats, which were not desirable places for children. He had noticed one curious fact, that working-class dwellings were very much better off than those built for the classes above in this matter. They would always find in working-class flats that there was much more area where the children can play than is found in the better-class flats. The reason of course was that explained by the fact that the Housing Department of the London County Council required a considerably larger amount of air space or of open space in working-class dwellings than was required for those of the middle or better class. To a certain extent that counteracted itself, because the higher one went in the scale the more the flat was regarded as a sort of *pied à terre*, a place to sleep in. Many residents in flats had their country houses and went away for the week-end, and the flat was simply looked upon as a place to put up at while conducting their business. It was a very common thing for a man to come to town on a Tuesday morning and leave on Friday night. When a man got to a retiring age it was perhaps rather better that he should do that than that he should retire altogether from his professional activities, which often meant effectively retiring into the grave. The new custom prevented a man from rusting out. But there was one point upon which he did not agree with Dr. Parkes, that was with regard to the statistics as to crowding on area. Perhaps he (Dr. Sykes) misunderstood him, but if Dr. Parkes meant statistics with regard to particular areas, there were numbers of statistics with regard to particular areas and also general statistics. For instance, it had been proved over

and over again in London, Paris, Berlin, New York, and other places, that in special areas in those cities, the nearer they approached to the city where the people were most crowded together so the mortality rose in the same proportion as the density. That was perfectly clear, so that he took it that what Dr. Parkes meant was that we have not yet decided how far the improved conditions of building and sanitation have qualified those statistics. Dr. Farr's statistics were absolutely useless now as a guide to the effect of the density of population upon life and vitality. But there were statistics of another kind. There were statistics of individual blocks of dwellings; for instance, the statistics furnished by Dr. Newsholme some years ago with regard to the Peabody dwellings. There were some statistics calculated by himself based upon figures carefully got out by Dr. Lovett, then medical officer of health for St. Giles's, for artizan dwellings in that district, the results of which confirmed Dr. Newsholme's point that whereas all other diseases and the deaths tended to fall in those dwellings, yet the classes of disease that tended to rise were the very diseases that Dr. Parkes said he does not think do rise: measles, whooping-cough, and diseases not taken to hospital, which children may have and run about with and spread to others. It was one of the reasons why it was urged that children living in dwellings of that type when suffering from measles should be taken to hospital or that some other means of isolation should be provided, for they undoubtedly spread the disease to adjoining families. But passing on to the question of the inflated price of land, and whether anything was going to happen in London which would retard this process of flat building, he did not think so at all. He did not think the price of land would fall, but would continue to rise. The reason was this: there were a number of such houses already built, more were being built in the outskirts; wherever population accumulates the price of land goes up. As building increased in the outskirts, the more would people from the centre go to live in the outskirts; but the houses in the centre would become filled, just as those in the outskirts were being filled, either by residents, or would be used as offices or work places, or something of that kind. But the price would certainly not come down, though it might remain stationary for awhile. Central London would be affected like every other big city in the world, Paris, Rome, Berlin, New York, which were all cities of flats centrally, and for that reason there is a rising price of land. The original idea was a walled city, but now the city was not walled for the purpose of keeping out an enemy, it was a city with a wall of houses, a wall which was equally effective in hemming in the population. There was one other important consideration which ought to be mentioned, a matter which should have more attention than it had yet received, and that was the living requirements of flats. The Metropolitan Branch of the Incorporated Society of Medical Officers of Health at their meeting in January last, a report of which was published in the proceedings of the Society for March, set out the minimum conditions that they considered should be required for healthy buildings as flats. With regard to

flats that were self-contained, it was insisted that there should be permanent through ventilation of any staircase, either from side to side or from the bottom to the top, in order to prevent aerial communication between one tenancy and another. Ventilation of enclosed courts from the bottom to the top should also be provided. That would get over one of Dr. Parkes's difficulties in regard to the air in those courts. At the present moment under the Building Act it was possible to so build these courts as to close them absolutely so as to be impervious to air. Of course, the Building Act said that adequate ventilation should be provided, but no one knew what adequate ventilation meant. How could there be adequate ventilation with windows and doors that might be kept locked? With an absence of ventilation the effect on those who lived there was extremely depressing and injurious. He had a case in mind of a lady who lived on the ground floor in one of these places, and her health was so indifferent that she had to go away into the country frequently. At last she was persuaded to live in one of the upper floors, and her health was immediately improved. Another point which medical officers of health insisted upon was that the w.c.'s in a flat should be cut off by a lobby permanently ventilated to the open air with openings or air-bricks. Then another point was that the corridors should be so lighted and ventilated as to be healthful, and especially to get rid of the smell of cooking and meals, a smell which was most noticeable in flats, owing to the fact that the closed corridors opened into the rooms. If they were ventilated independently of the rooms this result would not accrue. Another point he was glad to hear insisted upon by Mr. Rolfe, that only two flats should be constructed on one floor. If they went beyond that they immediately cut off the through ventilation, and it was extremely important to get the air through. Mere ventilation was not enough; the corridors must be flushed with air, as was needed in the case of rooms, which with only chimney ventilation would soon become stuffy.

MR. FRANCIS HOOPER (London) expressed satisfaction that this subject was engaging the attention of the Institute, as one which affected a constantly increasing section of the dwellers in large towns. In his opinion this form of co-operation was scarcely likely to diminish, hence it was of importance to study its dangers and drawbacks, with a view to their remedy. He fully endorsed the statement of the author of the first paper, that such homes were unsuitable for young children. The tendency was to crowd too much building upon the site, and in consequence many residences have insufficient light and air. Cross ventilation of sanitary blocks was both costly and difficult, but should be attempted, and means should be found for securing currents of air through all light and air shafts. The rapid and easy removal of dust and refuse was a matter needing careful consideration and intelligent supervision; whilst the deadening of sound in floors and partitions, as well as from staircase and service-lift, was no sentimental or trivial problem. The experience gained by

residence in a flat was of the greatest advantage to an architect in preparing his plans for this class of building. Co-operative catering from a central kitchen had already been tried, and would probably be extended; whilst co-operative heating had obvious advantages.

PROFESSOR H. R. KENWOOD (Stoke Newington) said there was perhaps just one point on which he would like to base a question. He had noticed in the flats which he had visited that the servants were almost invariably badly housed. He had seen them put into bedrooms which were mere *cul-de-sacs* of kitchens, and in other places which seemed to him to be such that no servant should be asked to sleep in. He knew that Dr. Parkes could not give them any information with reference to the vital statistics of the servants who were asked to live under these conditions. It would be interesting if some facts could be collected, because his own experience was that they were generally a poor-looking lot, unhealthy so far as one could judge, and he was not surprised at it. But vital statistics of domestic servants, while in service, are not obtainable; for when the domestic servant becomes ill she leaves her service, and if she dies her death is not, as a rule, even registered as having taken place in the neighbourhood of her work, much less in the dwelling where she lived and worked. It was stated by Dr. Parkes that servants as a class were not particularly enamoured of service in flats, and he would like to know if he thought that was not as much explained by the miserable sleeping accommodation which was so often provided for them, as by the other circumstances alluded to.

MR. G. H. TURNER (London) said that flats were all right in the centre of London for the middle classes but not for the working classes. Dr. Sykes made a valuable contribution to the discussion when he said that if people left the central parts and went into the suburbs that would not reduce the rents in the central parts. That was very important, because one of the reasons why local authorities would not give their consent to tramways to enable the working men to get into the suburbs was because landlords thought it would bring about a reduction of rents in London. It would do nothing of the kind, and he trusted that Dr. Sykes would repeat his words so that this might get into the minds of people.

MR. EDWARD WHITE, J.P. (St. Marylebone), said it appeared to him that before a man began to design flats or to build them, he had better gain some experience of the subject by living in one, as he had done. One great defect he noticed was the noise. They had a corridor with rooms on either side, and the servants who passed to and fro, especially in the early morning, were particularly annoying. They heard the whole of the operations going on in the house,

t could not be prevented, because the corridor was more or less a tunnel, very sound which took place in the corridor was communicated to the . He tried to prevent that by putting felt under the linoleum and things, but found it almost impossible to avoid the noise; and that was f the points he dealt with when he began building flats. Another diffi- he found was that the kitchen in the particular flat he occupied was when the front door was opened. This was most unpleasant, because ould hardly expect the servants to always keep the kitchen closed. The ns were not usually large apartments and it was necessary to have the open, and then they got the rattle and noise and heat and smell. Another was that the lavatory accommodation was placed near the kitchen, which xtremely unpleasant and a thing to be avoided in the design of flats. he was annoyed by the lift, for late at night, if the lift was working he had gone to bed, he heard the rattle of the carrier and the bubbling of ater in the hydraulic lift. All these were matters which it was desirable nedy if they could be remedied. A great deal depended upon the site they build upon and the quantity of the accommodation they had to get on to ite; with the high price of ground rents and the heavy cost of building, rs were naturally anxious to get as many rent-producing suites as they ly could upon the ground, and therefore the rooms were very often much er than they ought to be. It appeared to him that the writer of the second had grasped many of the difficulties, and had suggested what ought to be in the case of flats. He felt it most desirable that there should be a good corridor and entrance hall, and that the entrance hall should have an nal window. That was not possible in every case, but he found where it lone it was a benefit to the owner, for people on entering the hall were diately struck by seeing what was really another room and which could be as another room. Then another corridor would go on to the domestic part flat; that domestic part being shut off, as was suggested by Mr. Rolfe, by ng door. This would shut off the pantry, servants' bedroom, kitchen, and e other domestic portions of the flat, and enable the work of the house carried on without the noise being heard all over the flat. Another ad- ge of this was that the servants, who could not always be expected to adapt elves to the silent system, would occasionally be able to sing without g themselves a nuisance to the family. One of the most important things m, however, was that there should be plenty of window space in the lor. Many of the flats he had seen had dark corridors. He saw one was rented at between £400 and £500 a year, and when the servant went en the door to a caller she had to switch on the electric light. That was inly a great disadvantage. In many flats there were fanlights over the , but while these might be useful for ventilation they were undesirable the point of view of quietness and privacy, and it was therefore advisable

to get external communication if possible. One great advantage was that the kitchen quarters should be entirely separated if possible. They could only have one entrance, unfortunately, and the servants when they went in or out must do so through that entrance, but by having their quarters shut off considerable privacy was obtained, and guests need hardly be cognisant of the fact that there was any kitchen or servants in the flat. With regard to the matters mentioned in Mr. Rolfe's paper, such as tradesmen's lifts and fire escapes, staircases and balconies, he thought that now they were usually provided, but he would like to impress on persons who were erecting flats the importance of making provision for panic. As a rule, block flats had only one staircase, and if that became filled with smoke, it might make the staircase somewhat difficult for persons to use, and some provision ought to be made by which people could escape from the flat by other means. He found in his own case that this could be done by balconies outside the windows at the rear. Tenants who came to live in flats were, he found, fully alive to the importance of this, and generally made inquiries as to what were the means of escape in case of fire. Of course, there was not much chance of the ordinary staircase in a flat taking fire, because there was nothing to burn, and the only danger was that smoke might accumulate on the staircase and by frightening people cause a panic. It was important that the servants should have healthy rooms, but the fact was that in trying to get as many good reception rooms as possible for the use of the family there was an inclination to neglect the servants' quarters.

Dr. Cowburn (London) said he felt it was quite useless cavilling at flats as evils. Owing to the changed economic conditions of life they must recognise that flats had come to stay, and therefore it was more profitable to consider in what direction they could improve their construction, and he was glad to observe that this was the line taken up by most if not all of the previous speakers. Of course, ventilation was a most important health consideration in connection with flats and houses, and what must have struck a good many was, he should think, the absence of any benefit of upcast shaft ventilation in so many of these blocks. It was said there was upcast shaft ventilation, but it all went into the central lift way and none of it into the flats, and the flats merely got a cross ventilation from the windows when they happened to be open. If one went into an ordinary house of London construction, especially that kind of house which might be said to be cheek by jowl with the better class of flats, one noticed the marked difference in the atmosphere of the hall of a house, because there they had upcast shaft ventilation by the stairway, and not infrequently there was an opening at the top. It was easy to draw attention to that, but it was a very difficult matter to provide an adequate remedy, and it was more an architectural problem than a medical one. He was certainly very glad that Dr. Sykes had called attention to the necessity for the provision of cross ventilation in front of the water-closets, for that was a provision which even in the best class of flats appeared to be conspicuous by its

absence. He lived himself in a fairly well-constructed one, and there was no cross ventilation such as Dr. Sykes had drawn attention to. With regard to the necessity of having as neighbours those who would have some regard for other people's comfort that was of course a serious problem, and many attempts had been made comparatively recently in the Law Courts to provide some remedy for dwellers in flats who were annoyed by their neighbours. They had not so far, however, met with any very great success, and they were not likely to. The reason was obvious. The law of nuisance which governed this kind of thing was laid down in times long before the present conglomeration of buildings known as flats were contemplated, and therefore the framers never imagined that any such conditions were likely to arise. It was with a certain amount of diffidence that he rather questioned Dr. Kenwood's observations as to servants. It was true that a great deal of the accommodation provided for servants was altogether inadequate. Their rooms generally looked out on to these central wells, and that of course was not conducive to health; but what he did was to turn the servants' room, which opened into a closed area, into a pantry, and put the servants into a room which looked out on to an open space, and he did not see why that could not be done by anyone who had a proper regard for the comfort and well-being of their servants. He was surprised to hear the statement by Dr. Parkes that domestic servants as a class were not particularly enamoured of service in flats, for he had rather imagined that the contrary was the case. It was difficult of course to be dogmatic about it, but difficulties of servants in a flat were much decreased, inasmuch as they had very much less work to do in a flat than in a house. There were no stairways to clean, and nothing like the same amount of carrying to do. The work was in every way less, whereas the conditions of a servant in a large London house must be very trying. After all it was not fair to tax builders with providing bad accommodation for servants in flats unless they compared it with the accommodation they had in houses, and he questioned whether servants were very much better off in the basement of an ordinary London house, than they would be in the kitchen of a flat on the second, third, or fourth floor, which was well windowed and looked out into an open space. Now the kitchens of most flats, whatever might be the case with regard to the other rooms, were well situated. He had been into a great many and that was undoubtedly the case, and the kitchen was practically the servant's living room. He thought that if he were a servant he should much prefer to live in a kitchen on the third floor, well windowed and ventilated, than to be in the basement of a London house with all its attendant disadvantages. He did not think the observations of Dr. Sykes as to objectionable smells applied to the better class of flats, but any annoyance of that kind could readily be obviated by the provision of a corridor between the living rooms and the kitchen and offices. He was very glad and somewhat relieved to hear Dr. Parkes's opinion that he did not think there was reliable evidence to show that infectious disease was more prevalent in flats than in

ordinary houses. One would rather expect that to be so, because where infectious disease did occur in a flat the sufferer could be isolated rather more readily, and the isolation was more effectual as regarded the other flats than it could be in an ordinary house. Moreover, one would expect that the incidence of infectious disease would be less in flats than in houses for one obvious reason. Persons with young children usually preferred to live in a house rather than in a flat, consequently the majority of flat dwellers were persons in later age-periods of life.

THE CHAIRMAN (Sir William Emerson, F.R.I.B.A.) said it was his pleasant duty to put the vote of thanks which had been proposed to the readers of the papers. There were many points in Dr. Parkes's paper which touched on subjects worthy of the deepest consideration in regard to this question of flats. The discussion was mainly on better-class flats, and not with respect to those which were meant more particularly for working-class people. One gentleman made the remark that an Englishman's house was generally considered his castle, and possibly that feeling might be responsible for the position that England held at the present moment amongst the countries of the world, for it had brought out in the past a fine class of manhood. Any beneficial result from crowding into small areas he, for one, doubted. Dr. Parkes passed over this by saying: "There may be tendencies amongst these people towards slowly-advancing degenerative tendencies, which, at present imperceptible, may appear not in this but in subsequent generations; so that generalisations, in the absence of sufficiently-extended observations, should be avoided." That might be so. They had not sufficient experience at present, but he thought the class of men who had been brought up in the country, in good surroundings and in a healthy atmosphere, compared very favourably with the class of men found in the crowded parts of London. That was sufficient proof as to what the effect of crowding was upon human nature. Now, these flats were gradually bringing an enormous number of people into gradually smaller areas. He made a little calculation in looking over some flats the other day. They were built on a plot of ground of about an eighth of an acre, which would have taken three houses. It was in the west end of London and in a very decent square. These three houses would have accommodated say on an average about eight persons in each house—about twenty-four in all; or about 192 to the acre. Instead of building three houses they built twelve sets of flats in a block occupying the same space. These flats, on the average, would take about six persons each, the man, his wife, and two children and two servants, or a nurse and one child. This gave seventy-two persons in the block, or 576 to the acre. It was generally considered in hospitals that there should only be fifty, sixty, or seventy at the outside, to the acre; and if they put a thousand to the acre in some of the crowded parts of London and said it was good, he, for one, doubted it, and what the effect in the future of this constant crowding would be he did not know. That infectious diseases did not spread

in flats was a statement which required consideration. They had been lucky in escaping epidemics, but as to what would happen if they had a great outbreak, there was no means of telling at present. Dr. Sykes had remarked on the necessity for proper ventilation, but where means for ventilation were provided people often blocked up the openings. He knew a good many cases of that kind. He went into a flat to visit a couple of young people where proper ventilation had been arranged for, and the gentleman told him it was very draughty as it was, and so the landlord was intending to frame and glaze all the openings. He told him it might be less draughty, but it would be more unhealthy. That was the sort of thing which very frequently occurred. It seemed to him that these flats had come to stay, but it was due to a large extent to the landlords and builders, who were anxious to get the very last farthing out of their land. That was illustrated by the same block of flats he had already referred to. The houses would not have brought in anything like the flats.

CERTAIN ASPECTS OF THE HOUSING PROBLEM.

By JOHN ROBERTSON, M.D., B.Sc.,

Medical Officer of Health, Birmingham.

Read at Sessional Meeting, Birmingham, May 27th, 1905.

PROBABLY there are none of us here to-day who have not had practical experience in one direction or another with the Housing question. I shall therefore assume at once that I need not spend any time in a preliminary definition of what it consists of, and of the powers we possess at present for remedying the evils which we know exist. I will deal only with some aspects of the subject as they have presented themselves to me.

Housing Problem varies in different towns.—For the purposes of my paper I would like to emphasise the importance of recognising that while there is a housing problem in nearly every town, the remedy is not of necessity the same in each town.

I have had the good fortune to have had some experience of the conditions existing in five of our large provincial towns, and have been very much impressed with the differing aspects which the question raises in each of these towns. In one town, for instance, one gets all small house property on a short leasehold system, while in another it is nearly all freehold. Again, the relative number of unskilled labourers requiring the cheapest houses increases the difficulty in certain towns, while natural configuration of the site of the town may help greatly in diminishing or increasing the evil. In one way or another such conditions influence profoundly the action which is necessary for remedying the bad housing conditions.

The questions which I desire to bring before you for discussion relate rather to the ultimate remedy for the bad housing conditions in towns generally. Are the steps which are being taken sufficient within a reason-

able number of years to secure for each inhabitant in a town a wholesome house, with a possibility of wholesome surroundings?

Housing Problem of recent date and due to Commercial Progress.—It may be taken for the purpose of this paper that the making of towns is of quite recent date. The steam-engine was invented by Watt in 1769. The first railway for passenger traffic was opened in 1829, and since then our coal fields have been developed and have made it possible to establish large factories in the towns, and to carry in healthy country families from the country districts. Nobody dreamed that towns would grow at the rate they have done, and therefore no effort was made to direct their growth. The consequence is that we find in many of our large towns the bad conditions we are trying to remedy.

What are, then, the bad conditions referred to?

Ancient Houses out of date.—The first I would mention, which is by no means the most important, is that what was considered sufficient for our predecessors is not now sufficient under our altered conditions. In every town we have ancient houses in narrow alley-ways, often damp and dark. Most of these are now unfit for present needs. When they were erected they had attached to them gardens and had comparatively rural surroundings. A good many of us dislike tampering with these relics of bygone days, for they are substantial, though out of date as regards modern ideas of sanitation. For the most part these houses are now occupied by the poor, and in many cases are subdivided.

Badly-constructed, short-lease Property.—The second class of bad house is of comparatively recent date; indeed, for the most part, they have been built since the introduction of the steam-engine and factory. I refer to the large number of houses built from twenty-five to a hundred years ago. They were the result of the boom which took place in land values near towns. Each owner tried then to build on his land the greatest possible number of houses, and as there were at first few, if any, building regulations and, at a later stage, only very imperfect regulations, he usually succeeded in getting out of his land a very satisfactory return. Most of these houses are now out of date. They are damp, and crowded as regards area, the water supply is defective, as also are the sanitary conveniences and drainage, and the roads are rather too narrow and badly arranged. To begin with, it was possible for the dwellers in these houses to get easily into the open country, but now they are closed in by a suburban barrier, which makes it practically impossible for the young people to see the green fields and the beauties of nature, except when some philan-

thropic individual treats them to an outing. In a great many towns these houses were built on the back-to-back plan.

Courtyard System.—What is even worse still they were built on the courtyard system, or common-yard system, where the occupiers had the joint use of water, conveniences, washhouse, and yard.

Nothing has degraded our people, and especially our women, more than this system of common courtyards in many towns. As I shall point out later, this question of common usage of the essential conveniences of a dwelling is, in my opinion, one of the bad features which we want to get rid of with great determination.

In addition to the general defects which I have mentioned, there are many others possessed by this system which do not concern us directly as sanitarians, but which are important from the point of view of the social welfare of the people. For example, many of these houses are situated in dark courts and alleys where thieves and vagabonds may abide without the correcting influence of public view or police inspection. Such people do not like to be seen of men. Then, again, the conveniences are so situated that in many cases modesty and even decency are sorely strained. In some cases this is the possible cause of ill-health among women.

Bad Houses in Country Districts.—There are other classes of bad houses which have to be dealt with, such as the damp hovels one meets with in country districts; but I am limiting my remarks to town districts, and especially large towns.

What is to be the remedy for the evils which arise from the slum houses in the midst of our large cities? I believe that the first essential is to constantly have in mind what are the minimal requirements of all families, and to see that both new and old houses comply with these.

Minimal requirements of houses in towns.—The minimal requirements I would suggest are as follows :—

1. That the house shall be self-contained, however small, that is to say, that water, drainage, conveniences, and refuse removal shall be separate, and under the responsible control of the tenant of each house.

2. That as regards cubic capacity the essential rooms should be adequate in proportion to the size of the family. If properly used 300 cubic feet of bedroom accommodation per person will be found sufficient in practice. In this respect I would deprecate the provision of a best room or parlour in the smaller houses, which in the vast majority of such houses degenerates into a dirty lumber room, which smells fusty from want of ventilation. A working woman with a family is one of the very

hardest worked persons, and not at all able to do the unnecessary work of keeping this best room in a good condition.

3. That it shall at least comply, as regards structural condition, with the model by-laws in respect of new buildings. In the case of old houses, it may be difficult to condemn those which do not in some respects comply with these by-laws. In the case of new houses, on the other hand, a good many of us would desire to see a more liberal interpretation of the value of a by-law which at present in so many cases is taken as a sort of specification of what is to be done. The essential feature is that the house shall be dry, and so constructed that it is possible to keep it clean.

4. The fourth essential which I would refer to is somewhat new. It is that in town districts there should be in reasonable proximity to all dwelling-houses an open space to be used as a playing field or recreation ground for persons of all ages. At the growing edge of a city this can be acquired at a moderate cost before the land is developed, while for the central districts their size must of necessity be somewhat more limited, and even then the cost must be great. There is a danger, however, on account of the cost of defeating their object by making them too small. I have no hesitation in saying that in many parts of Birmingham and other large towns no space is available to allow children to have healthy organised exercise. The consequence is that many develop the habits of street corner men before they reach their teens. To me it is always most depressing to know that the children in a district have to go two miles to get at a patch of green grass where they may romp. Every year it becomes more difficult for the children of the central slum districts to get to the green fields at the periphery of a city. In Birmingham I believe there are many thousands of children who have no opportunity of their own free will of getting into a large open space, and this will as time goes on affect an even larger number.

Those of us, too, who know the value of these large open spaces as breathing areas in a town will appreciate this as another of their uses. It is extremely difficult or impossible to give statistics of the value of such open spaces. It is only by examining the physical condition of the children in our poorer areas and comparing these with children in more favoured situations that we get an idea of the extent of the mischief which is being wrought by housing conditions, one of the attributes of the house being the open space.

5. Another minimal requirement of houses for the working classes is cheap means of transit to allow of a population spreading itself over an

adequate area. This is essential, whether we consider the dweller in the centre or his better-paid brother in the suburbs.

In former times such cheap transit was not required, as practically any part of the town was within walking distance. Now the available area for a town has been enormously increased by trams and trains. I would urge that as much good will be obtained in the direction of housing by cheap and rapid tram and train service as is being accomplished in many places by municipal building in the suburbs.

For many years now our suburbs have been reached at the rate of six or seven miles an hour by train or tram. I believe this rate of travel is slowly being increased, and at the same time the cost is being reduced. In Birmingham, where we are beginning to municipalise our trams, it is of extreme importance that our means of transit should be quickened and cheapened. As far as I can see, this will be done by our electric trams. The available area covered by an electric tram system as at present worked is relatively a small one, and the rate may be put down as something less than six miles an hour, so that a workman will have to spend half an hour in travelling three miles to the centre.

In not many years to come we shall have to deal with people of the artizan class who live five or six miles off, in which case a much quicker rate of speed is required, so as to enable a workman to get in in not more than half an hour. I do not like to predict how this increased speed in transit is to be accomplished. There are indications, however, in our tube railways and in express tram services and fast trains that means are being found to meet the requirements.

I feel strongly that this question of quick transit must go hand-in-hand with the provision of houses and of open spaces.

The five separate propositions that I have set out form what appear to me to be the essential requirements for housing the so-called working classes. I do not think any town has attempted to deal with all of them on a sufficiently wide basis yet. The necessity for dealing with the latter two has only recently been forced on our notice, and therefore there is some excuse for going slowly to begin with, especially as both are costly matters.

Housing Work already accomplished.—The work which has been done since the passing of the first Housing Act in the central districts of various towns might, for practical purposes, be divided into two or three classes. In the first class I would place those schemes which have had for their object the opening out of crowded areas without any large provision of small dwellings to replace those which have been disturbed.

Birmingham Improvement Scheme.—No better example of one of these schemes can, I think, be seen anywhere than in Birmingham. The lessons which can be learned from our local scheme are extremely valuable. It has been the means of clearing out a large number of badly-arranged, narrow and dark streets, and of turning what was land of comparatively small value into land of great value.

The result has been that a very fine street has replaced these slums, and instead of much cottage property, large shops and offices have taken its place. I should say that in order to make provision for certain of the displaced tenants, cottages have been erected, but these are only relatively few in number compared with the houses that have been done away with.

The rebuilding on the Corporation Street improvement area is not by any means complete yet, but the portion that is complete gives a good example of what can be done. The expense has been great, and for a considerable number of years to come it will be a charge on the rates. So soon, however, as the sinking fund has been paid off the Corporation will own a very valuable property, and when the leases fall in, the fine tenements which have been erected on it will be an added source of income. So far as the financial part of the scheme is concerned, the present generation are taxing themselves to provide something which will be a source of income for a future generation, that is to say, we are looking ahead to make our condition better in the future.

In this case the process is a very slow one. The scheme was started in 1875 when, on the 1st October, my predecessor, Dr. Alfred Hill, presented a representation in regard to the area, setting out that it was an unhealthy one. The total capital expenditure, as estimated at the completion of the scheme, is £1,750,000. It will be a good many years yet before all the available sites will be taken up on this area.

Other similar schemes are necessary in Birmingham in order to open out the slum districts in the centre of the city, and to make broad roadways to the peripheral districts. Until, however, the cost of the Corporation Street scheme is further reduced, it is probable that the present ratepayers would not like to embark on another.

A good many other towns have adopted somewhat similar schemes. Personally, I think they are of great value from a housing point of view, because they get rid of slums of the worst type in a very effectual way, and leave no room for rebuilding any large number of houses in these central districts to replace the people unhoused.

Municipal building in suburbs.—Another form of housing scheme which has been carried out in a good many districts is to build workmen's dwel-

lings in suburban areas where land can be obtained at a cheap rate. So far as Birmingham is concerned it has not yet carried out such a scheme, although land has been purchased for the purpose. Such schemes have a great advantage in one respect, viz., that houses can be erected to let at a cheaper rate than those built by private enterprise, and as our greatest difficulty in the Midland towns has been the provision of cheap houses, a good deal can be said in favour of municipal building in suburban areas. No fear need exist that such schemes, if properly devised, will not pay for themselves. The only real criticism which has been raised to such schemes is that in the event of the municipality undertaking the actual provision of houses, it would mean their ownership of a considerable proportion of dwelling-houses for the poorer classes, if they are to deal with this subject on a sufficiently large scale.

Need for cheap houses.—The number of adult males in a city like Birmingham who do not receive when in full work more than twenty-five shillings a week is very large indeed. These are the unskilled labourers employed in works and on railways, ordinary labourers, porters, etc. I believe a great many of them do not receive a sufficient wage to keep themselves and their families supplied with the ordinary necessaries of life. This, however, is a question which does not concern us to-day, except that it is of prime importance that they should be supplied with decent house accommodation. In large cities like Birmingham, schemes of building for the poorer working classes must fail unless at the same time cheap means of transit are provided.

Both of the first two methods of housing are permanent, and provide in one way or another new houses for the people. There is, however, a third method, and this is one that is being carried out on an extensive scale in Birmingham at the present time, and one in regard to which I specially desire to draw your attention.

Another plan adopted in Birmingham.—We are at present requiring the owners of about 1,000 houses every year to put them into habitable condition, and in a great many cases to open up the courtyards and let in fresh air and light. The idea which the Housing Committee had in urging this procedure was the evident necessity under the circumstances which existed in Birmingham of retaining in the city as many low-rented houses as possible. I will ask you to inspect some of the work which is being done on these lines this afternoon, and you will then be able to see for yourselves wherein its value lies.

Such work, however, does not bring these houses up to the ideal which

I have already laid down. Most of them remain as back-to-back houses in common courtyards, and without a water supply in each case. Houses which formerly were filthy and verminous, extremely damp, with all the woodwork dilapidated, and with stores of dirt underneath the floors, are now dry and clean; they are better lighted and ventilated, and more open to public observation. The main part of the work done at each house is the provision of damp courses; the laying of concrete floors so as to prevent the tiles absorbing damp from the soil; the removal of the dilapidated plaster from the walls and ceilings; and the thorough cleansing of the cavity above the ceiling, which we usually find in an old house to be filled with a large amount of flocculent dirt, the accumulation of years. The houses which close in the yard are also removed, so that passers by in the street may see what is taking place in the yard. During the year ending December 31st, 1904, I represented no less than 1,119 insanitary houses to be dealt with on these lines, and during the present year, and for some years to come, there will be no difficulty in finding in the City of Birmingham each year an equal number of houses that are quite unfit for human habitation on account of their dampness, dilapidation, and filth.

One of the reasons why we have such a large number of insanitary houses in the centre of Birmingham is that the property is almost entirely leasehold, with only a few years of the lease to run. The houses have been slimly built, and now that the leases have nearly run out, we find that the property is not only badly constructed but very dilapidated. In addition to showing you some of the bad property which will be dealt with, our journey this afternoon will take us to other property in course of reconstruction, and still another lot in its completed condition.

Dirty and Destructive Tenants.—Another aspect of the housing question is the growing carelessness and recklessness of the tenants. There can be no doubt that a great deal of the damage which arises from bad housing is enormously aggravated by the dirty habits of the tenants. They could, even in the slums, live much more healthful lives than they do at the present time if reasonable cleanliness were exercised on their part. I merely mention this aspect as one which requires attention when dealing with the housing problem in big towns.

One further remark I would like to make, and it is that judged by available death-rates, the mortality in these slum districts in our large cities is really much worse than the death-rates represent it to be. For instance, in typical rural areas the death-rate was, in 1903, 12·9 per 1,000, while in slum areas in a large city the death-rate will vary from 25 to 30

or even more. If, however, the strong healthy adults who aree very year imported from the country districts into the town were stopped from coming in, the death-rate in the rural districts would go down, and that in the slum districts would go up considerably.

Description of the Alterations and Repairs effected in a Court in New Summer Street (typical of the class of work done).

(Information supplied by the Housing Inspector, Birmingham.)

The houses, Nos. 88, 90, and two houses at the back of the same have been removed, under Section 38 of the Housing of the Working Classes Act, 1890, as obstructive buildings; and the gables of the adjoining houses have been reconstructed in 14″ brickwork to the first floor and 9″ brickwork above.

The roofs have been overhauled and thoroughly repaired.

The walls have been raked and pointed throughout.

Damp-courses have been inserted in every wall.

The matchboarding has been removed from the walls, and the old plaster hacked off and replastered.

The chimney-stacks of houses have been rebuilt with blue brick heads set in cement.

New quarry floors have been provided, laid upon a 3″-bed of concrete.

All defective woodwork has been taken out and made good.

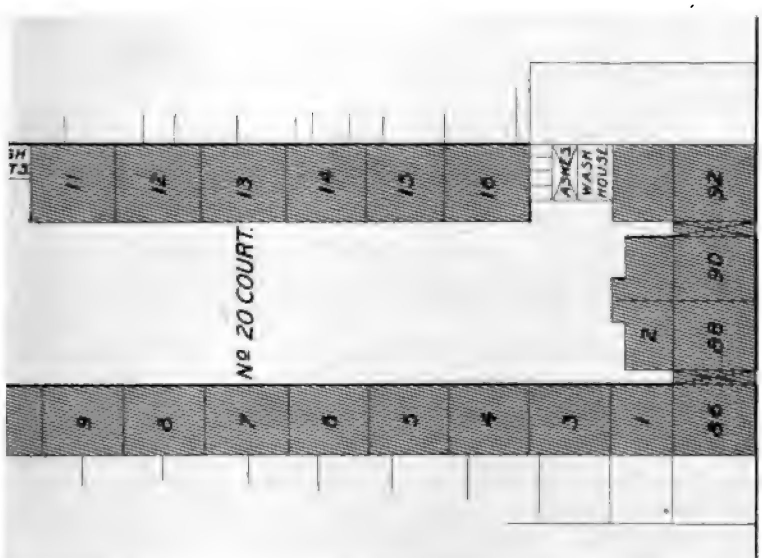
All living-room ceilings have been taken down, the cavities cleared and limewashed, and new ceilings provided.

Pantry windows have been made to open with ventilation at top.

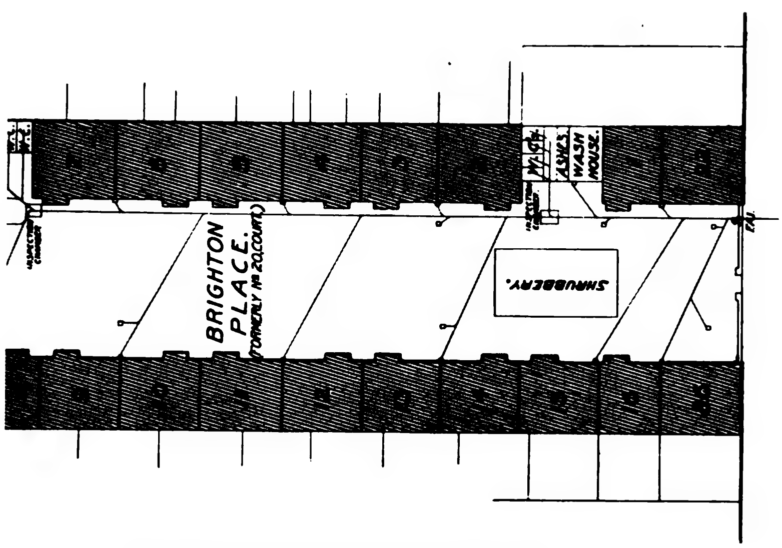
Bay windows have been provided to living-rooms, with top and end sashes made to open; also new doors, jambs, etc., have been provided.

A lot of dilapidated shopping at the end of the Court has been demolished, and upon the site so cleared, nine w.c.'s, two washhouses, and the accommodation for eight sanitary bins have been arranged.

Stoneware sanitary sinks have been provided in every house, with discharge over a 4″-gully in yard.



COURT IN NEW SUMMER STREET.
Property before Repairs.



COURT IN NEW SUMMER STREET.
Property after Repairs.

COURT IN NEW SUMMER STREET.
View showing houses obstructive, removed to open the Court.

COURT IN NEW SUMMER STREET.
After Alterations and Repairs.

COURT IN NEW SUMMER STREET.
After alterations and repairs.

ALDERMAN COOK (Birmingham), on behalf of the City Council, extended a dial welcome to the Institute to Birmingham. The housing problem, he l, was acutely connected with infantile mortality and the spread of tuberculosis. mentioned what the city council were doing in remedial directions, and said t while he personally was in favour of taking plots of land on the outskirts owns for building artizans' dwellings, without any cost to the rates, still he ocated substantial improvement in the midst of large towns, for a very large portion of the population must always remain dwellers in the towns.

COL. J. LANE NOTTER, as Chairman of the Council of the Institute, wished hank Mr. Alderman Cook for the welcome he had expressed to this meeting he Institute on behalf of the City of Birmingham, and said that the work of The ral Sanitary Institute in the promotion of public health was so closely associated the work of the public health committees of large cities, that they had many rests in common, and these meetings of the Institute did much to elucidate itary problems, and to form public opinion which was so essential to support public health measures designed by the Corporation. The Royal Sanitary titute had gained much by the co-operation and support of the Corporation Birmingham in the past, and he hoped that further opportunities for mutual stance might arise in the future.

MR. J. H. BARLOW (Bournville) pointed out that they were taking for nted the evil arising from overcrowding and from insanitary dwellings. How at that evil was, might be gathered from the fact stated by Dr. Robertson in paper, that for many years to come it would be necessary for the Birmingham horities to deal with considerably over 1,000 houses per annum which were resent in an unfit state for human habitation. Putting aside for the moment h suggested remedies as the Garden City, near Hitchin, the way of reform eared to lie in two directions, viz., that of slum clearance, and that of the elopment of the suburbs. The cost of slum clearance had proved to be so at that many people were asking whether some other method could not be pted by which expense to the rates could be saved. He felt that slum arance was absolutely essential, but he could not help thinking that the cost ght to be a charge against the owner of the condemned property rather than ainst the public. Turning to the second direction which reform might take, spoke of the importance of preventing badly built and badly laid out suburbs wing up, which in a short time must degenerate into new slums. This, fortunately, was what was happening round several large towns, and it was olutely essential that it should be prevented. This could be done largely by isting upon the five reforms advocated in Dr. Robertson's paper. What was nted in fact was a firm administration of the law as it already existed; this

would undoubtedly accomplish a great deal. He thought, however, that further powers were needed, and referred to the example of Germany, where municipalities have power to purchase large belts of land round the cities with a view to securing their proper development, and where site plans are prepared well in advance, indicating in what way land shall be built up. As an example of what could be done in the suburbs he referred to the village of Bournville, four miles from Birmingham. The village, which had been founded by Mr. George Cadbury, and subsequently presented to the nation, consisted of about 600 houses with a population of 2,800 people. The houses were semi-detached or in blocks of four, each house having its own garden of about 600 square yards, and everything had been done to preserve the rural aspect of the district. There was a great demand for the houses, the gardens were highly appreciated and successfully cultivated. The health of the village was good, the death-rate for 1904 being only 6·9, and the infant mortality 61. The scheme was sound financially. Rents were now being fixed to yield a net return of 4 per cent. on the houses. He believed that such villages could be satisfactorily established outside our large centres of population. It was a standard that ought to be aimed at in the development of our suburbs, and although there might be difficulties, the object was well worth working for, and would result in the creation of a happier and healthier England.

Dr. P. Boobbyer (Nottingham) said that Dr. Robertson had given them an excellent sketch of the housing problem, especially as it presented itself in the city of Birmingham, but the aspects of this problem were scarcely less numerous than the places affected by it. They were all familiar, of course, with some of the many existing types of slum dwellings, from the rookeries of Scotch tenements to the single kennels of most English towns. These slums had come to be such from various causes and combinations of causes. Many ancient houses, good enough (or esteemed as good enough) in their own day, were now both out of date through radical sanitary defects in their original plan, and worn out by use and abuse and the passage of time. Other houses, put up before the dawn of the era of sanitary reform in the last century, or at any rate before the advent of rational by-laws, had never been decently fit for habitation, but were now hopelessly bad. But, bad as these various houses were in themselves, they must not lose sight of the fact that the typical slum denizen by his habits and mode of life increased their unfitness, and especially their apparent unfitness, to a very material extent. The fact that in every slum district certain houses and groups of houses existed of similar age and structure to their neighbours, the condition and general aspect of which, to a superficial inspection at least, appeared all that could be desired, houses which stood like oases of order, cleanliness, and comfort amid a surrounding desert of squalor, and which evidently owed their superiority over the rest to the better habits of their tenants, amply

demonstrated the truth of the last statement. They must not forget, too, that there were good, indifferent, and bad people in almost infinite gradation in every social grade, and especially that there existed a considerable proportion of people in every such grade who had to be kept decent and clean and straight (if they were to be so at all) only in spite of themselves; people, that is, who could not be depended upon to act as good citizens without considerable help and encouragement, and in the slums degenerates of this class being left to their own devices stood revealed in their true colours. One could speak at great length upon this subject, so many side issues arose from it. Much of the difficulty of public scavenging in poor districts, for instance, came from the hopelessly degraded habits of people of this class, and the more one did the more one was called upon to do to keep them and their surroundings decent. He had lingered upon this topic in order to emphasize the necessity for a large disciplinary and educational element in every scheme of improvement. In places like Bournville and Port Sunlight, he might remind them, people were required, as a condition of tenancy, to conform to a certain standard of household management and personal conduct. He had said that the solution of the housing problem, or, rather, of the rehousing section of it, depended upon the special circumstances of individual centres. For example, the huge tenement blocks of Millbank, Boundary Street, and Drury Lane in London, and the smaller tenements of Liverpool and Glasgow and other large cities, afforded more or less suitable accommodation for populations locally employed, where cheap and rapid transit was not available as a bridge between country home and town work-place; but there could be no doubt that the scheme which afforded the best prospect in every respect for the future of the unfortunate slum resident, and especially from the educational point of view, was the country cottage with garden attached, with the cheap fast train or tram as means of transit to and from work. It behoved local authorities, however, to consider very carefully the special requirements of each housing case with which they were called upon to deal, before deciding how they would deal with it. Two examples of the disadvantage of failing to do this occurred to him, in the empty cottages of the London County Council at Tottenham and the long empty, but now demolished, tenement blocks of the Nottingham Corporation at Basford. The distance between home and work, it must be remembered, involved many drawbacks, as everyone must know who had lived outside and worked inside some large modern city. Therefore, when garden cities like Bournville and Port Sunlight were possible, combining as they did the advantages of country residence with proximity to the place of work, they constituted a much better and more complete solution of this many-faceted problem than either of the other plans. One of the worst disadvantages of a long distance between home and work-place was the useless expenditure of time and energy involved in going to and fro. Referring to the economics of the subject, he pointed out that these were more

satisfactory to the philanthropist than the financier. In touching upon the legal machinery for carrying housing projects into effect and the attitude of the Local Government Board in the matter, he contended that the defects of the Housing of the Working Classes Act, 1890, and the unreasonable demands of the Local Government Board in respect of rehousing schemes, had been largely responsible for the comparative inaction of many municipalities in recent years. Loss of capital and increase of overcrowding had been the principal results of housing schemes in many places he could mention.

PROF. A. H. CARTER (University of Birmingham) spoke of the personal aspects of the housing problem. The first requirement was a strong, intelligent, sympathetic public opinion, without which little progress could be made. Among the most important conditions of housing reform were public enlightenment, sympathy, and recognition of social responsibilities. Administrative bodies could not be active or efficient in the absence of public interest and support. But something more was needed, and that was personal service. If everyone who was not disqualified by age or infirmity would render some kind of social service, the social situation would be transformed. It was as dishonourable to repudiate social debts as personal economic debts. The solution of the housing problem demanded not only the creation of opportunities for betterment, but ability on the part of tenants to seize them and to make right use of them. Broadly speaking, the former was the business of the local authority, while the latter could only be accomplished by direct personal agency. In illustration he quoted the work of Miss Octavia Hill, and hoped shortly to introduce her system into Birmingham. He also attached the greatest value to the work of official lady visitors. Health education was greatly needed in elementary schools; by continuation classes, boys' and girls' clubs, after the school age; and (in later life) by organized teaching of cookery, domestic economy, and the laws of health brought as near to the homes of the people as possible. With a more widely diffused spirit of citizenship, and by a fuller recognition of the privileges and obligations of civic life, much might be done.

PROF. A. BOSTOCK HILL (Birmingham) congratulated the Institute and the meeting on the fact that the speeches had dealt with so many aspects of the question; indeed, not only had the question of the houses and their structure been dealt with, but the matter had been referred to from the social and humanitarian point as well. Referring to Dr. Robertson's paper, he wished to strongly accentuate the view as to the uselessness of the parlour to be found in most working class cottages. His experience was that the room was practically unused, except perhaps for an hour or two on Sundays, and consequently became either damp and the home of dry rot, or else the place where all

sorts of things were deposited, and even at times animals or birds kept. It seemed to him a very serious matter that in some respects the most important part of the cubic space, averaging perhaps 20 per cent. of the total space of the house, should not be utilized, when overcrowding was so common in many cottages. He had known eight people sleeping in a small bed-room when room taken up by the parlour might have been utilized; in fact, the parlour of the working classes was a fetish, much in the same way as in many instances the small drawing-room was in Suburbia. He further pointed out that probably the housing question had a much more important bearing now than at any time, because in the early part of the sanitary era, ill-health and death were caused by the grosser defects of sanitation, such as bad drainage and improper water supply; and now that the majority of municipalities had put these matters on a proper basis, it seemed to him that little else could be done in further reducing the death-rate than in improving the domestic conditions of the people themselves. He further considered that the housing question was not only one dealing with the structure of houses, but also with the people themselves, because, as Dr. Boobbyer had said, it was quite common to find an oasis in the desert of squalor in the very worst places, surrounded by houses in the filthiest condition. He believed further that one aspect of the question to be considered was the education of the people to appreciate the conditions they should demand in houses, and this could only be done by educating the people in personal sanitation; the present generation by means of women health visitors, the rising generation by the teaching of hygiene in schools. One other point he felt to be of great importance, namely, that when sanitary authorities took proceedings against people for violation of the by-laws, they were insufficiently supported by the magistrates in many instances. He quoted a case in which he was interested, where a new house in the country was kept in such a condition that it was impossible to enter the down-stairs room until the doors and windows had been opened for some minutes, so awful was the stench within. Proceedings were taken against the tenants after repeated remonstrances, and the hands of the authority were weakened by the magistrates practically dismissing the case on the payment of costs. Sympathy with the tenants under the circumstances was not to be wondered at, but at the same time it was very important that when sanitary authorities took action against dirty tenants their hands should be strengthened as far as possible.

DR. C. KILLICK MILLARD (Leicester) said he would restrict his remarks to an aspect of the housing question not dealt with by any of the previous speakers, though rightly emphasised by Dr. Robertson in his excellent paper, viz., the necessity for cheap and quick transit. The importance of this aspect was scarcely yet realised, but he believed that no really satisfactory solution of the housing problem was possible in our large cities until existing means of transit

were greatly improved. It was recognised that the ideal arrangement was for the population of a town to be spread over a comparatively large area in the outskirts and suburbs of a town instead of being overcrowded in the congested central districts. This was the great principle on which Bournville had been built, and which was to be put into practice for a whole town in Garden City. It was obvious, however, that if this principle were to be carried out in our great cities, the area covered would be so great that without quick and cheap means of transit workpeople could not afford to live in the outskirts, but would be forced to crowd into the centre. As regards the manner in which quick and cheap transit was to be secured, a good example of what could be done was the tube railways in London. In very large cities underground or overhead electric railways would probably be necessary, but in smaller towns they must look to an improved electric or motor traction service along existing routes. As regards speed, very much could be done if only the necessity for a faster service were recognised. The speed at which road vehicles could travel with safety was very largely a matter of education. Public trams and omnibuses should be vested with some of the privileges of the fire-engine, and other vehicles should be made to give way to them much more promptly than at present. Stops should be less frequent, and the public should be taught to be more expeditious in mounting and dismounting. Street improvements at awkward corners, etc., should be made. As regards cheapness, it was all-important that profit making on public means of transit should be entirely subordinate to the benefit of the public. The existing penny or twopenny fares were much too high for the working classes if they were to use them daily for getting to and from their work. He believed that in many places where trams were now running little more than half full, it would be possible, without serious loss, to reduce the fares very greatly and run the cars nearly full. One suggestion was to issue weekly season tickets to workpeople at greatly reduced rates. The details, however, were rather for experts, and would soon be settled if the great importance, from a sanitary point of view, of cheap and quick transit were once fully realised.

COUNCILLOR J. S. NETTLEFOLD (Birmingham) said there was one remark which seemed to require some amplification. Referring to housebuilding in the suburbs, Dr. Robertson had said, "Houses can be erected by Corporations to let at a cheaper rate than those built by private enterprise." They could certainly be let at a cheaper rate; it was not equally certain that they could be erected. The municipal housebuilders' methods of keeping accounts were not in accord with ordinary business methods. Their desire to let their houses at the cheapest possible rent led them into omitting various important items from the debtor side of the account. The Birmingham Potter Street scheme was a striking example: Two or three years ago the municipal housebuilders presented a scheme for erecting flats on this site, and submitted figures showing a small credit

balance; twelve months later the Housing Committee brought the same scheme before the Council, together with the actual cost that would be incurred. The correct figures showed an annual deficit of about £200, and the scheme was abandoned. The existing Corporation houses were another case in point: the land on which these houses were built was not charged in the accounts. The Finance Committee of the Birmingham City Council had drawn attention to the loss that was being made on those houses, and yet no alteration was made in the way the accounts were presented, with the unfortunate result that housing reformers outside Birmingham were misled by the example of the committee responsible for those accounts into talking of the credit balance on the Birmingham Corporation houses, and founded their housing policy upon unreliable information. But suppose, for the sake of argument, municipal house building was really cheaper than private effort. It would be evident to the most superficial observer that no local authority could house more than a very small proportion of its population. The funds at its disposal for housing purposes would be exhausted long before its work was finished. He asked the meeting to consider whether that was fair. It was the duty of local authorities to treat all their constituents alike, and therefore he wanted a plan that would ensure fair play all round. A plan was required for what Mr. Barlow had so aptly described as "saving the suburbs," and they had it in the town extension plan adopted by many German cities. These cities owned or controlled large tracts of land on their outskirts. This land was laid out on a complete comprehensive and far-seeing plan, with wide arteries, narrower side streets, sites for churches, schools and institutions, and open spaces, the last of which being to his mind one of the most important items. There were many advantages attained by that policy, and not the least important was that fair play was ensured for everybody. Dr. Boobbyer had drawn attention to the imperfections of Part II. of the 1890 Act; there certainly were difficulties, and yet with determination these difficulties could be got over. They had, to a large extent, been got over in Birmingham, and that afternoon they would see a few typical examples of what had been done. To Dr. Robertson and to the housing department officials great credit was due for the energetic and efficient way in which the policy laid down by the Birmingham City Council had been carried out. Alderman Cook wanted to go further; so did he, much further, and the Birmingham City Council Housing Committee would go much further if the forces of obstruction that had been so active against them all along the route did not prove too strong for them.

MR. F. BALLARD (Malvern) said medical officers of health ought to have more powers for dealing with insanitary property; their appointments should be made permanent, with absolute power to condemn houses unfit for human habitation, allowing the owner to appeal to the Local Government Board. Magisterial proceedings should be made unnecessary, as they have only stood in the

way of the proper course being taken. If the sanitation of rural districts were good, and the picturesque thatched cottage so much admired by dwellers of towns condemned as an abomination unfit for human habitation, there would be one cause less for the rural population flocking from country to town. In one case in the district where he lived, the death-rate in one of these picturesque villages had risen to 23·2; while in his own parish he might be accused of egotism for pointing out that the death-rate was only 8·9, largely owing to an active parochial committee and to a considerable reduction of thatched cottages. While feeling very much indebted to the reader of the excellent paper, he favoured semi-detached cottages. They could be constructed cheaper than single cottages, yet with privacy; and the out-offices should always be separate and with different access to each house.

MISS G. WATKIN (London) emphasised the remarks of a previous speaker as to the need for better education of the working classes in hygiene, quoting instances from her personal experience as a manager of slum property during the last four years; and expressed her conviction that until such education was introduced they would never succeed in satisfactorily solving the housing problem.

DR. BERRY (Wigan) forwarded the following notes. Owing to the interest taken in the discussion on Dr. Robertson's very interesting paper, the time proved too short for any more members to take part in it. With regard to the minimum requirements for each house he entirely agreed, particularly with regard to the house being self-contained, and the cubic capacity of the bedrooms, and that the Model By-laws with regard to structural conditions in respect of new buildings should be complied with; also with regard to the fourth essential, namely, open spaces or playgrounds should be provided. He thought himself that in most towns it would be difficult for the authorities to build houses for the very poor that would bring in a return sufficient to pay the interest on the outlay and keep them in good repair, although Corporations had an advantage over private builders in being able to borrow money at a low rate of interest. The sessional meetings of Liverpool and Birmingham had been of the greatest interest, showing by the papers and discussions how the important subject of Housing was being dealt with in different places. The remaining part of the sessional meetings at both places was practical and instructive. In Liverpool, showing how courts and slum property had been demolished and tenement dwellings built in their place; in Birmingham, however, the present method of dealing with insanitary houses in streets and courts showed how Dr. Robertson was putting his practical experience into force. The manner in which these courts were being dealt with was one that seemed peculiarly applicable to Birmingham. The way in which these courts were opened out and the dilapidated

ouses renovated, showed a possible way of dealing successfully, for a time at east, with insanitary houses without displacing the tenants, who had to reside ear to their work. Although many of these houses were still back-to-back ouses, the space in front and the renovating of the interior made them habitble. Even this work, which had been done at a cost to the owner which saved im from having the houses closed, caused him to add to the rents as much as wenty-three per cent. in some cases. If he might make a suggestion, the space n front of the house should be flagged instead of as at present paved with ricks, the paving being ungrouted. The flagging, which could be done at a ttle more cost by using the Hard York Non-slip flag, would enable the surface o be flushed and cleansed regularly with water by means of a hose-pipe. Though his plan did not provide for the demolition of insanitary dwellings, it was a nethod that temporarily dealt with that class of property and avoided the necessity in Birmingham of erecting tenement dwellings, at a large cost to the atepayers.

COUNCILLOR STEVENS (Birmingham) also took part in the discussion.

DECISION OF COUNCIL ON RESOLUTIONS PASSED AT MEETINGS OF THE INSTITUTE.

SESSIONAL MEETING at Bristol, following papers by D. S. DAVIES, M.D., D.P.H., and T. H. YABBICOM, M.Inst.C.E., and discussion on *Isolation Hospitals*—

> "That this meeting is of opinion that the opposition to hospital isolation accommodation arises from a lack of appreciation of the essential conditions that contribute to its success, and therefore urges that the provision of such accommodation for large centres of population is imperative, and that one bed per 1,000 of population is a good working minimum."

The Council desire to state that they have noted this resolution.

OTES FROM THE REPORTS OF THE MEDICAL OFFICERS OF HEALTH.

SMALLPOX IN DUBLIN, 1903.

Extract from the Report of the Medical Officer of Health for Dublin, 1903.

BY SIR CHARLES CAMERON, C.B., M.D., D.P.H.

Sir Charles Cameron describes the serious epidemic of smallpox in blin in 1903, which cost the city £5,581.

"The five agencies employed to check the spread of the disease were: prompt removal of patients to hospital, (2) prompt removal of 'contacts' to Refuge, (3) vaccination and revaccination, (4) a thorough search for cealed cases of smallpox, and (5) thorough disinfection of infected dwellings, truction of the clothing, &c., of the patients, and disinfection of clothing, &c., the 'contacts.'

"I have not the least doubt that the existence of the Corporation Refuge in cholas Street, prevented the disease from becoming as widespread and ensive as on the former occasions when it was epidemic in Dublin. Several rs ago, at my request, a house belonging to the Corporation in Nicholas eet, and long unlet, was converted into a 'Refuge' or temporary home for sons whose dwellings were undergoing disinfection. Ruinous houses, one on h side, were taken down, so that the Refuge was isolated from other ellings. At its rear there is a large open space, from which the house is ered. 'Contacts' were brought into this open space through a gateway.

"At the beginning of the epidemic there was accommodation for 30 persons the Refuge, but by a little over-crowding the number could be increased to 40. March I suggested that the accommodation should be increased by putting a wooden building, comprising 4 large rooms, in the open space at the rear the Refuge. The Public Health Committee acceded to the request, and M'Carthy, City Architect, had the building completed by the end of March. beds then numbered 48, and as young children slept with their mothers ping accommodation for about 60 persons was now available. A new tory and baths were added to those already in existence.

"On the notification or discovery of a case of smallpox all the persons in house infected were promptly brought to the Refuge. Whilst there their

clothes were disinfected, and they got warm baths. They were well fed. Although they could not be legally brought to the Refuge or detained there unless with their consent, the 'contacts' never made any objections: probably they were under the impression that they could be compelled to go into it.

"In the earlier cases all the 'contacts' were detained until the period of possible incubation of the disease had passed. When the cases became numerous this course was found impracticable, but the persons who were in actual contact with the patients were detained the full time. Throughout the epidemic all the persons who had resided in houses in which cases occurred were kept in the Refuge until the whole of the infected houses were disinfected, limewashed, and cleansed.

"The disinfectants employed were solution of corrosive sublimate, 0·2 per cent. in strength, and formalin gas, or solution of formalin used as spray. Immediately after disinfection the walls and ceilings were whitewashed, and the floors and woodwork washed, carbolacene being used in the cleansing process.

"In order to hasten the disinfection process, work was carried on after official hours, and frequently all night and on Sundays. The disinfection apparatus was in operation day and night and on Sundays during the height of the epidemic.

"Owing to the difficulty of getting vehicles to convey the 'contacts' to the Refuge, the Public Health Committee purchased an omnibus capable of holding 12 persons, and drawn by two horses. Four horses were purchased, as the work of bringing articles for disinfection and returning them to their owners had enormously increased, and a large number of vans had to be employed for the purpose.

"The total number of persons lodged in the Refuge during the epidemic was 1,402.

"The managers of schools were notified of the cases of smallpox, so that children from infected houses should not be admitted to the schools. Some schools were for a time closed at my request. Notifications were also sent to the pawn offices.

"Not a single case of smallpox occurred in the street in which the Refuge is situated, except in the Refuge itself, the cases there being 'contacts' from infected houses."

ABSENCE OF FOG IN BATH.

Extract from the Report of the Medical Officer of Health for Bath, 1904.
By W. H. SYMONS, M.D., M.R.C.S., D.P.H.

Dr. W. H. Symons remarks in his Annual Report:—

"We never get a real fog in Bath; 1904 was noted for its fogs in London, but in Bath there were only six days when the outline of trees or houses could not be seen at 9 a.m., at a distance of 1,000 feet; we should call these dense

fogs, whereas in London during a dense fog one cannot see an object at a distance of ten feet.

"The scale we use in recording mists is based upon the limit of visibility; if a hill twelve miles distant can be clearly seen, we should record no mist, but if a hill six miles distant could not be clearly seen, we should note F 1, 3 miles, F 2, 1½ miles, F 3, . . 1,000 feet or 400 paces F 8, 200 paces F 9. Lamp posts are useful units at night if their distance is known."

HOW CASES OF INFECTIOUS DISEASE ARE DEALT WITH IN THE PORT OF LONDON.

Extract from the Report of the Medical Officer of Health for the Port of London, 1904.
BY HERBERT WILLIAMS, M.D., M.R.C.S., D.P.H.CAMB.

"The staff available for dealing with cases of infectious disease, comprises :—

"(1) Medical Officer of Health; (2) four Boarding Medical Officers; (3) seven Sanitary Inspectors; (4) three Steam Launches for removing patients; (5) Nursing Staff, &c., at Hospital.

"All vessels from foreign ports, on arrival at Gravesend, are visited by the Boarding Medical Officer, who is appointed by your Committee for this purpose He investigates every case of illness then on board, or that has occurred during the voyage, and in the case of vessels arriving from ports infected, or suspected to be infected with Plague, Yellow Fever or Cholera, he proceeds on board and makes a personal examination of the persons thereon. All cases of infectious disease are removed to the Port Sanitary Hospital at Denton, which consists of three pavilions each containing two wards, and one pavilion with one ward (used exclusively for the reception and treatment of patients suffering from Smallpox), making four pavilions in all.

"The Hospital is fully equipped, the staff consisting of a Matron and three Nurses, Caretaker and wife—the former removes patients and disinfects, the latter doing the laundry work.

"A Washington-Lyon's Disinfector is provided for the disinfection of infected articles. This is supplied by steam from a water-tube boiler, which permits of steam being obtained very quickly, and enables the process of disinfection to be carried out with as little delay as possibie. The contents of the chamber are exposed for a period of thirty minutes to a temperature of 255° Fahrenheit. The effects, after disinfection, are either returned to the ship at once or stored in a weatherproof shed.

"The patients are removed from the ship in an ambulance boat towed by a launch, as owing to the shallowness of the water in the vicinity of the Hospital, the launch is unable to get near enough to the landing stage.

"In the case of vessels infected with Plague, Yellow Fever, or Cholera, they are ordered to moor opposite the Hospital, this being the place appointed in

accordance with the Local Government Board Regulations relating to those diseases.

"The Boarding Medical Officer stationed at Sheerness adopts the same routine in respect to vessels entering the River Medway, which is within the jurisdiction of this Authority.

"When a case of infectious disease is found, the vessel either proceeds to Denton to land the case and be disinfected, or the launch proceeds to Sheerness and the patient and infected effects are brought to Denton. Disinfection of the vessel in the latter case is done at Sheerness.

"Cases of infectious disease occurring on vessels within the limits of the Port are removed by launch, when practicable, with all infected effects, to Denton.

"The procedure of disinfection is the same in all infectious diseases, but in the case of Plague, where a case of human or rat Plague is proved to exist on board the ship, that vessel must be fumigated with a view to the destruction of all rats and vermin on board.

"The terms of the Paris Convention, 1893, permit this to be done either before or after discharge of the cargo, and I propose in future to fumigate and disinfect all parts of the vessel that can be done at Gravesend, with the exception of the holds. The vessel will then be allowed to proceed to dock, and arrangements will be made for mooring her and discharging her cargo into lighters whilst lying out in the middle of the dock. After the cargo has been discharged the vessel will be fumigated throughout from stem to stern, with a view to destroying any rats, etc., on board. These will be carefully collected and cremated in the ship's furnace.

"It is not practicable to fumigate the holds of a ship previous to the discharge of cargo, except by means of an expensive and complicated apparatus, and, indeed, it is not advisable that this Committee should take the responsibility of so doing, as they may have to meet and contest claims made in respect of actual or alleged damage done to the cargo by the process of disinfection. An inquiry is being made by the Local Government Board as to the best method of destroying rats and vermin on board vessels without damaging the cargo.

"Any bacteriological examination that may be necessary to confirm the diagnosis of Plague and Cholera has been performed hitherto by Professor Klein, F.R.S., on behalf of and at the expense of the Local Government Board. This procedure will in all probability continue. Any further necessary examination will also be performed by Professor Klein, but at the expense of the Port Sanitary Authority.

"An ample supply of drinking water of good quality is available at Gravesend for supply to vessels. It will therefore be seen that the Port Sanitary Authority is in a position to deal with any possible epidemic with absolute confidence."

NOTES ON LEGISLATION AND LAW CASES.

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ADULTERATION.—*Sample—Purchase for Analysis—Mode of dividing sample—Sale of Food and Drugs Act, 1875 (38 & 39 Vict. c. 63), s. 14.*

Upon the hearing of an information under s. 6 of the Sale of Food and Drugs Act, 1875, it appeared that the purchaser asked the seller, a grocer, if he sold cream of tartar, and the seller produced a box containing penny packets labelled cream of tartar. The purchaser asked for, and was supplied with, four packets from the box, all of which were similar in size, outward appearance, and label, and paid fourpence for them: he then emptied the contents of the four packets into one heap and divided the whole quantity into three parts and sealed them up, handing one part to the seller, another to the public analyst, and retaining the third himself:—

Held, that each packet was not a separate article for the purposes of the Act, and that the mode in which the contents of the packets were dealt with by the purchaser was a sufficient compliance with the requirements of s. 14 of the Act.

Mason v. Cowdary (1900) 2 Q.B. 419, distinguished.

SMITH *v.* SAVAGE. Div. Ct. 88.

SEWERS AND DRAINS.—*Drain or Sewer—Drain-pipe draining several Houses belonging to the same Owner—Sewer draining into single Private Drain—Local Government—Public Health Act, 1875 (38 & 39 Vict. c. 55), ss. 4, 41—Public Health Acts Amendment Act, 1890 (53 & 54 Vict. c. 59), s. 19.*

A drain-pipe receiving the drainage of several houses, the property of one owner, does not cease to be a sewer within the definition in s. 4 of the Public Health Act, 1875, because it is connected with a single private drain, to which s. 19 of the Public Health Acts Amendment Act, 1890, is applicable, and by means of which the drainage of the houses is ultimately conveyed to a public sewer.

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JACKSON *v.* WIMBLEDON URBAN DISTRICT COUNCIL. C. A. 27.

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"The Boarding Medical Officer stationed at Sheerness adopts the same routine in respect to vessels entering the River Medway, which is within the jurisdiction of this Authority.

"When a case of infectious disease is found, the vessel either proceeds to Denton to land the case and be disinfected, or the launch proceeds to Sheerness and the patient and infected effects are brought to Denton. Disinfection of the vessel in the latter case is done at Sheerness.

"Cases of infectious disease occurring on vessels within the limits of the Port are removed by launch, when practicable, with all infected effects, to Denton.

"The procedure of disinfection is the same in all infectious diseases, but in the case of Plague, where a case of human or rat Plague is proved to exist on board the ship, that vessel must be fumigated with a view to the destruction of all rats and vermin on board.

"The terms of the Paris Convention, 1893, permit this to be done either before or after discharge of the cargo, and I propose in future to fumigate and disinfect all parts of the vessel that can be done at Gravesend, with the exception of the holds. The vessel will then be allowed to proceed to dock, and arrangements will be made for mooring her and discharging her cargo into lighters whilst lying out in the middle of the dock. After the cargo has been discharged the vessel will be fumigated throughout from stem to stern, with a view to destroying any rats, etc., on board. These will be carefully collected and cremated in the ship's furnace.

"It is not practicable to fumigate the holds of a ship previous to the discharge of cargo, except by means of an expensive and complicated apparatus, and, indeed, it is not advisable that this Committee should take the responsibility of so doing, as they may have to meet and contest claims made in respect of actual or alleged damage done to the cargo by the process of disinfection. An inquiry is being made by the Local Government Board as to the best method of destroying rats and vermin on board vessels without damaging the cargo.

"Any bacteriological examination that may be necessary to confirm the diagnosis of Plague and Cholera has been performed hitherto by Professor Klein, F.R.S., on behalf of and at the expense of the Local Government Board. This procedure will in all probability continue. Any further necessary examination will also be performed by Professor Klein, but at the expense of the Port Sanitary Authority.

"An ample supply of drinking water of good quality is available at Gravesend for supply to vessels. It will therefore be seen that the Port Sanitary Authority is in a position to deal with any possible epidemic with absolute confidence."

NOTES ON LEGISLATION AND LAW CASES.

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ADULTERATION.—*Sample—Purchase for Analysis—Mode of dividing sample—Sale of Food and Drugs Act, 1875 (38 & 39 Vict. c. 63), s. 14.*

Upon the hearing of an information under s. 6 of the Sale of Food and Drugs Act, 1875, it appeared that the purchaser asked the seller, a grocer, if he sold cream of tartar, and the seller produced a box containing penny packets labelled cream of tartar. The purchaser asked for, and was supplied with, four packets from the box, all of which were similar in size, outward appearance, and label, and paid fourpence for them; he then emptied the contents of the four packets into one heap and divided the whole quantity into three parts and sealed them up, handing one part to the seller, another to the public analyst, and retaining the third himself:—

Held, that each packet was not a separate article for the purposes of the Act, and that the mode in which the contents of the packets were dealt with by the purchaser was a sufficient compliance with the requirements of s. 14 of the Act.

Mason v. Cowdary (1900) 2 Q.B. 419, distinguished.

SMITH *v.* SAVAGE. Div. Ct. 88.

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SEWERS AND DRAINS.—*Drain or Sewer—Notice to abate Nuisance—Local Government—Public Health Act, 1875 (38 & 39 Vict. c. 55), ss. 4, 94, 95.*

The defendant had for some years discharged the sewage from his house into a pipe running alongside a country road, which pipe had been laid down by an adjoining owner for his own protection for the purpose of carrying off the surface water from the highway and so preventing it from flowing on to his premises. No water other than the rain water from the highway and the sewage from the defendant's house passed along the pipe. It had never been repaired by the Local Authority or treated by them as a sewer. A breakage having occurred in the pipe it became stopped up, and the defendant's sewage collecting above the stoppage caused a nuisance. The Local Authority took proceedings against the defendant under s. 94 of the Public Health Act, 1875, for the purpose of compelling him, as "the person by whose act, default, or sufferance the nuisance arose" to abate it:—

Held, (1) That it was no defence for the defendant upon these proceedings to show that the pipe was a sewer which the Local Authority were liable to repair. (2) That under the circumstances it was not a sewer.

WINCANTON RURAL DISTRICT COUNCIL *v.* PARSONS. Div. Ct. 34.

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JOURNAL
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IE ROYAL SANITARY INSTITUTE

SANATORIA FOR CONSUMPTION—LOCATION AND DESIGN,

By EDWIN T. HALL, V-P.R.I.B.A.
(FELLOW, AND MEMBER OF COUNCIL.)

Read at Sessional Meeting, June 16th, 1905.

HAVE written and lectured before on Sanatoria for the treatment of tuberculous patients, and I fear it is impossible to avoid repetition, my hope lies in the fact that that will be forgiven me, and in the ainty that my poor efforts in the past have reached only the few.

An organized attack on this wasting disease must be sustained to be ny avail, and a campaign of many years' duration will alone attain the ect we have in view of awakening the whole community to the impor-ce of the subject. The recent important and representative deputa- which waited on the Metropolitan Asylums Board in April last has en new zest to the consideration of the subject.

Sanatoria are among the chief object-lessons presented to the public, they are and should be distinctive in character and design, and arate in appearance from hospitals of other kinds.

They are centres for disseminating knowledge to patients and their tors as to the fundamentals of sanitary living: schools of hygiene re the practical value of sunlight and fresh air, of regularity of living, rcise, cleanliness, and orderliness are taught, and their beneficial effects demonstrated by the improvement in the patients' health, the arresting l, in a good percentage of cases, the cure of the disease under which y are prostrated.

To-day we have to consider the location and design of these buildings, re particularly as they affect us here in England.

Under the term Location we include the qualities which should deter-

mine the site, its relative elevation, its subsoil, water supply, the facilities for sewage disposal; shelter, prospect, and aspect.

The best position for a sanatorium is the southern slope of a gentle hill, near its summit, with tree shelter on the north, east, and west. For subsoil, sand or gravel is the best if attainable, because it is dry and warm, but a naturally well-drained site must in any case be obtained so that the land may not get saturated with water, otherwise it will be cold and unsuitable.

A pure water supply must be available, and before any site is adopted full inquiries on this head should be made. In many hard sand or rocky soils it may be impracticable to sink wells at all.

Sewage disposal is of great importance. If a public sewer is at hand it would naturally be used; but if this is non-existent then other systems must be considered. Where there is a large area of meadow land available a simple system of filtration and precipitation aided by chemical infusion, with ultimate disposal on the land, is sufficient. In several large German sanatoria (among them that at Falkenstein) this is satisfactorily adopted. At Nordrach nothing but the common cesspool is used, emptied by a vacuum pump into closed carts, which distribute the untreated liquid on to the land.

At the Nuremberg General Hospital, a very large institution, the sewage is collected, chemically treated, and then turned into open settling tanks; the precipitated sewage is then drawn up and hydraulically pressed into cake for manure, the liquid running away.

The septic tank system is used in England, but there is no doubt that in many cases the smell from these tanks is considerable until they mature, but eventually they give a safe effluent in which fish can live.

A screen of trees for the shelter of the sanatorium is the best and most pleasant, better than a bare hillside, because it breaks wind currents without arresting them or causing eddies. Prospect is of great curative value. It should be as wide, extensive, and pleasant as possible, something to engage the patient's attention, to broaden and extend his mental vision, to teach him to study nature in her varied moods.

In aspect, south is best of all, where the sun's direct rays may permeate every room, cheering, cleaning, and germ-destroying.

The ideal situation is a hill side covered with pine trees, ever green and exuding invigorating fragrance, open gardens on the south and sides, a common or moor beyond, rich with gorse and heather, undulating country wood-clad, and a rapid river or sea in the distance. All these can rarely be obtained with any one site.

We now come to Design, and this is a subject in which are involved any considerations.

Firstly in importance is the welfare of the patient, and secondly the convenience of the administration.

It is to be noted that architects and medical men of different countries equently approach the subject from the point of view of buildings and ial institutions with which they are most familiar.

The one-unit building (based on the hotel or barrack) appears to ve been, and still largely is, the type in Germany, France, and Switzer-nd, and the sanatoria are three, four, and five storeys high.

I may cite from Germany the Falkenstein Sanatorium. It is in effect large hotel, which began from a small private mansion, but has been ded to at different times.

The kitchens, larders, and offices are on the basement of the central ilding, U-shaped on plan, the arms being nearly at right angles to the ntre.

This block faces E.S.E. It is four storeys in height including the sement, and there are three main staircases. To the N.E. is a very ge dining hall opening on the S.S.E. to a wide verandah, which is tended to form a covered promenade 200 feet long. The other corre-onding wing has an enclosed gallery facing west. The medical staff uses and consulting rooms are at the extreme ends.

There are no regular nurses, but the whole plan is under medical ection, and accommodation is provided for 120 patients of either sex, in single and 25 double-bedded rooms. Most of them have south aspects, t many have not.

There are only two slipper-baths for patients, and a douche-room.

The Liegehallen are attached, forming wide verandahs on the three les of the terrace at the basement floor level, and in the grounds there e several open pavilions and summer houses.

Ruppertshain is a compact building, crescent in form, consisting of a sement with four storeys above in which the administrative departments d patients' room are all contained.

It accommodates 112 patients in wards containing one, four, and six ds each. These rooms are in single file and face south with a corridor n the northern side. There are two main staircases.

There are nine slipper-baths and one douche-room for men, another for women.

There are a matron and five nurses.

The Liegehallen are two-storeyed, one on each side, attached as wings.

At Engelthal the *Nürnbery Heilstätte* is one building with basement and four other floors. Here again the administrative departments are in the same block as the patients.

Fifty patients are accommodated in 17 bedrooms; two only have one bed, others three and five beds each. All face south. There are three nurses.

There is but one staircase in the building, which would hardly pass our fire-escape authorities.

There are four slipper-baths and three douches, all in the main building, as are also the six w.c.'s.

The Liegehallen are detached.

The last two institutions described are, it will be seen, of the one-block type, but the next is quite different.

The Städtisches Sanatorium at Harlaching near Munich is, to be accurate, a hospital where the large majority of patients are consumptive.

The main block is E shaped, three storeys in height, with no basement.

It receives 212 patients, 106 of each sex in 28 wards, 12 with single beds, six with 12 beds, and six with 20 beds. There are besides a few isolation wards.

There are four staircases and one passenger lift.

There are 12 slipper-baths and three douches divided into six groups, each having two slipper and one douche bath in a single room divided by partitions. There are 18 w.c.'s, each group of three with a slop sink being in *one room* with *one* window, and all in the body of the building.

The 20-bed wards are axially east and west, the 12-bed wards north and south, all with windows on both sides. The single rooms face east or west, and the isolation rooms north.

The Liegehallen are three storeys high, forming 12 feet wide verandahs of solid masonry on the southern side of the 20-bed wards, which are thus practically cut off from all sun.

There are other Liegehallen in the grounds.

There are two very handsome chapels in this hospital.

The nursing staff consists of 23 and a matron.

The administration block is separate and is a hollow square on plan, with the engine and boiler houses in the centre of the quadrangle.

It contains the staff-residences, the kitchens, staff dining-rooms, laundry, cow-stables, &c.

The disinfector is strangely placed in the basement of the staff block.

It will be seen that this very modern and complete hospital disregards

hat we regard as of great importance, namely, aspect, abundant sunlight ı all rooms, and detachment of sanitary apparatus.

The last illustration of these buildings which I am able to show is that f the *Volksheilstatte* at Krailing, in Bavaria, and it is more like our ccepted type than any other, but it has a basement and three storeys. ts plan consists of a centre with two wings at very flat angles.

It takes 120 patients. There are 13 single-bed wards, the others ontaining two, three, four, five and six beds, all facing S.S.E. or S.S.W. There are two staircases. Four slipper-baths are provided in one room, and there is one douche-room.

Here again the 18 water-closets are in groups of three in *one room* with *one* window, and all are in the heart of the building. There are also n the body of the building rooms fitted with 30 lavatory basins. The iegehallen are recessed verandahs under the patients' bedrooms of the le wings.

The nursing staff consists of 15. The staff all live in this same ilding.

I have had an object in mentioning the nursing staff at the various ces referred to, firstly, because it affects the accommodation to be proled, and secondly, because a member of the recent deputation to the tropolitan Asylums Board, made the suggestion that the staff of nurses d not be large in our sanatoria.

The key-note of all these German institutions is concentration with tralization. Administratively this is possibly economical, but economy y be attained at the sacrifice of things more important.

We in England aim at greater segregation of patients; at the removal the staff when off duty from the locality of their work to pleasant roundings; at the isolation of all sanitary conveniences, so as to keep air of patients' buildings free from contamination.

Now there are varying methods of attaining the objects aimed at. me advocate the separate hut, some cottages for a few, others buildingits for 12 to 24, and again others one block to hold a large number.

At Pinewood, the King's Sanatorium, and Frimley, the rooms have nerally single beds; at Northwood they have generally eight beds in a rd, but this last is a country branch hospital rather than a sanatorium.

The one-bed ward is, I believe, most recommended because one patient not disturbed by another coughing. There are, however, advantages having a few two and three bedded wards, as in cases liable to sudden emorrhage the presence of another person to summon assistance may be

was unadvisable, as a rule, to choose a site low down on the slope of a co hill, or at the base of a high cliff. More stress might have been laic speakers on shelter against strong wind, which was ill borne by most con The design of a sanatorium should be influenced by its location. (rapid slope a more concentrated plan was admissible. Where there shelter against wind a longer building was advisable; but in protected there should be gaps at intervals for ventilation. As regards sanator poor, he pleaded for small buildings, approximating to the village pl was more like what could be recommended for convalescents. Châlets advantages as regards quiet, privacy, sunniness, and ease of ventilation, difficult to supervise in large numbers, and to keep clean; and were ins for the feeding of bed patients and for access to bath rooms, etc. T maintenance of wooden buildings had been exaggerated. If treated wit tar they were pleasing to the eye and inexpensive to maintain; moreover, more quickly habitable and drier than brick or stone buildings if these much heated. He referred in confirmation of this to a museum buildi by Mr. Jonathan Hutchinson to a country town. Tall buildings were t noisy, and gave less easy access to the grounds. They had the adv regards view from the top, and as regards freshness of air in sultry Perhaps a tower with a lift might be added to a sanatorium compos buildings. Single bedded rooms were necessary in certain cases; tall not be prevented where several patients were together; and in feb absolute rest was important. A few rooms with a dressing room attac be useful for patients requiring a special nurse. It was a mistake recreation rooms near patients' bedrooms. Dr. Theodore Williams ha to the advantages of sunshine. Practical experience showed that it w important at times to be able to have shade. He expressed his p listening to Mr. Hall's admirable paper, and to Dr. Heron's remarks in less expensive buildings.

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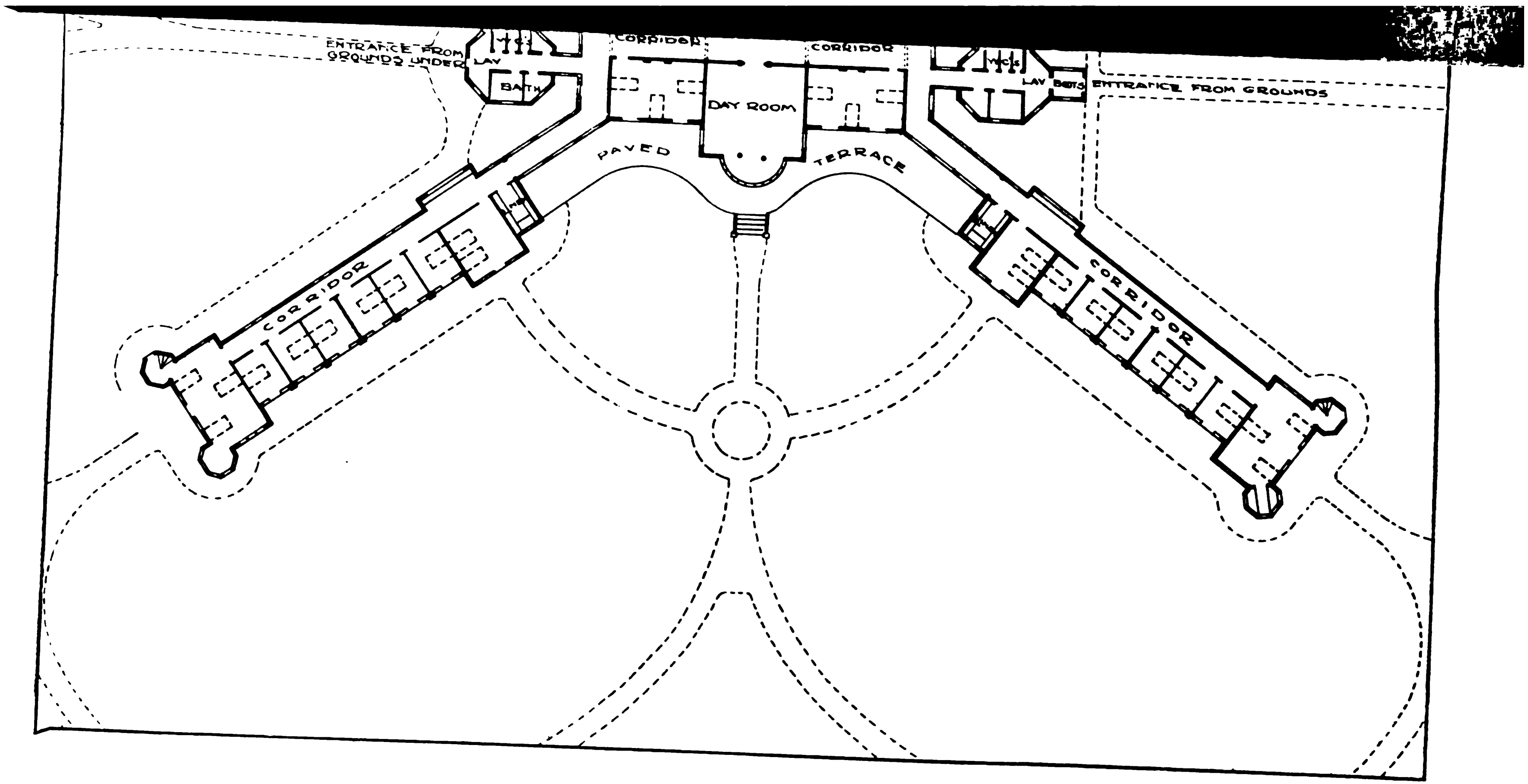
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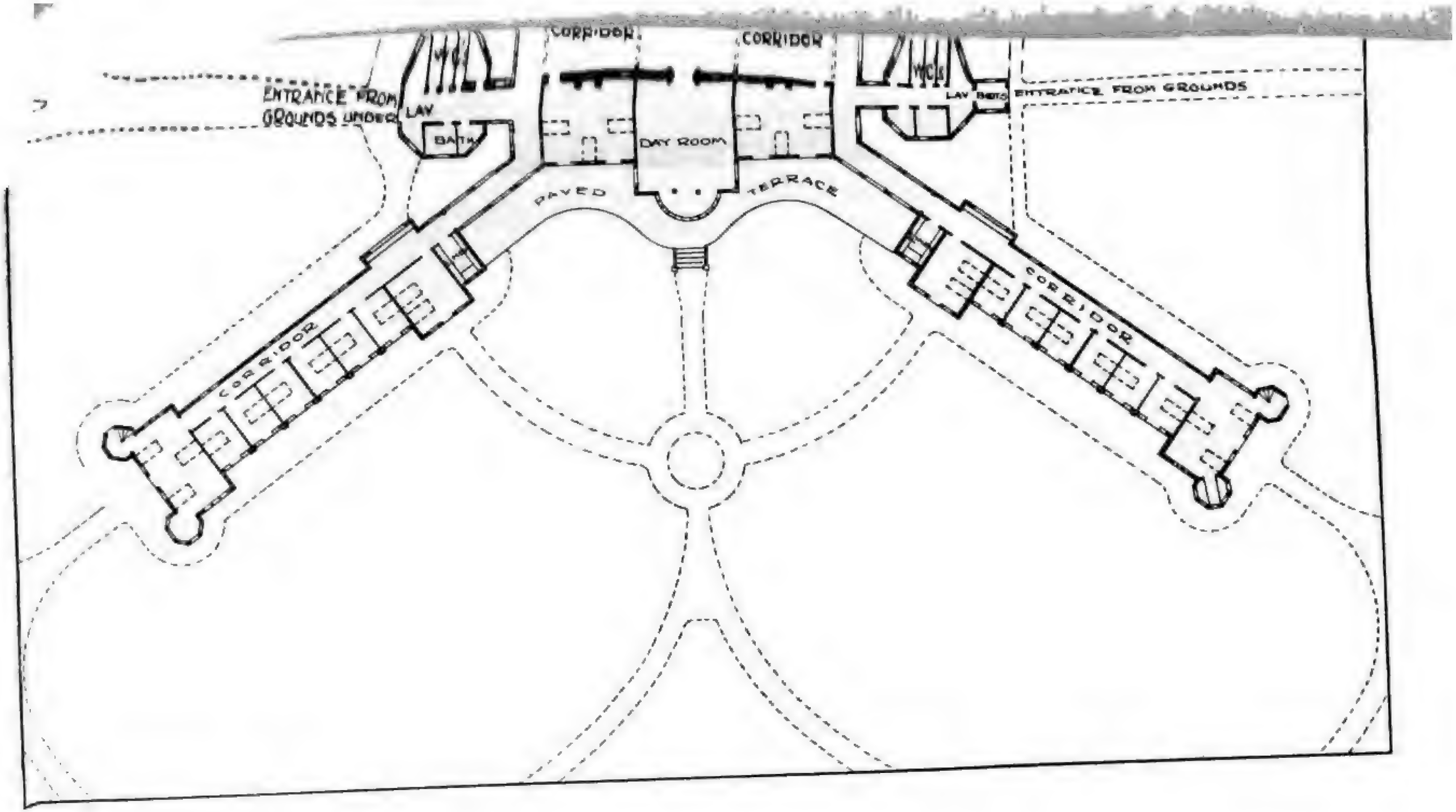
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HELBY (Chairman of the Hospitals Committee of the Metropolitan Board) said he came there to hear the discussion on Mr. Hall's paper, he hopes of gaining information as to the most suitable style of buildings eception of patients suffering from phthisis, and not with any intention ig in the discussion. However, as the Chairman of the Metropolitan Board (Mr. Scovell) had been the only layman who had spoken, there erhaps be an opening for a few words from himself. He had been greatly ed, and even amused at the speeches which had been made. The speakers d taken part in the discussion, with the exception of two or three ts, were gentlemen of the medical profession. Among these gentlemen emed to be a great difference of opinion as to the treatment of consumptive . He was completely nonplussed with the opinion of several medical men ted that phthisis ought not to be treated at a seaside institution, the sea being suitable for such cases, for the Metropolitan Asylums Board had , acting on the advice of one of the most eminent medical men of the day, to make alterations to a newly erected convalescent home at the seaside, Rustington, near Littlehampton, at a cost of about three thousand pounds, lren suffering from tuberculosis. Again, another medical gentleman said, ght to take the curative cases only, while others suggested all cases of . If the latter were taken it seemed to point to the necessity for two of buildings being required, one as a home for the dying, where those in stages of consumption would be housed, and sanatoria for those in the ages. The speakers did not point out how those in the early stages of ption were to be discovered, he thought that those cases when they were hould be notified in the same manner as infectious cases were now under the Act. His experience as a guardian was that the working-man ed to work as long as he could, and did not complain until he was lly in the incurable state. It would thus appear that the greater part of mmodation would be required for this class of patient, where the greater would remain until they died, some might live for years in this state, be unfit for work. Then would come the question what was to become amily of the man, during the time he would remain in this home. t an Act of Parliament there would of course be no means of detaining that it would be possible for a man to leave the home whenever he fit. As to the character of the buildings, there even appeared to be a of opinion amongst the architects upon this point. He agreed with vell that in the long run the cheapest would be well-built permanent s. He said well-built, because much would depend upon the manner in he building was constructed. For instance, the Metropolitan Asylums iine years ago erected the Brook Hospital, and so well was it built that nothing had been necessary to be done to the structure since that date. case, however, of the Park Hospital, which was opened in November, id the Grove Hospital, which was opened in August, 1899, repairs had

never ceased, and they were still going on. In fact, the members of the Board often asked jokingly, "Were they still standing?" It was nevertheless fair to say that there was a so-called temporary hospital, which had been so well designed for administrative purposes that it was the cheapest hospital under the Asylums Board. If temporary buildings were erected, similar to those recently built at Gore Farm, they would not cost more than £150 to £160 per bed, and they would last for very many years. The Fountain Hospital, to which he had alluded, had been in use for over twelve years, and had just been made a fire-proof building at a cost of about £20 per bed, and there was little doubt but that it would last a further fifteen to twenty years. Nevertheless, permanent buildings were, as he had said before, no doubt the cheapest in the long run. As regards temporary buildings, some medical gentleman stated that they did not want painting as often as once in three years. Experience led him to say without the slightest hesitation, especially where the buildings were erected in exposed positions, that much of the wood and iron work should be painted every second year. He noticed that Mr. Hall, when alluding to the sanatorium erected at Frimley, did not mention the cost of that institution. He hoped that in his reply Mr. Hall would give this small detail, as of course the cost would be an important item in dealing with the question. In conclusion, Mr. Helby said that before any headway could be made with the question there were three points to be cleared up. 1. The medical profession should make up their minds as to the treatment phthisis patients should receive, bearing in mind the two classes, curative and non-curative. At present the profession seemed to be in a fog. 2. The architects, having ascertained what the medical profession recommended, should put their heads together, and design a building or buildings based upon the requirements of the medical men, and state the approximate cost per bed. 3. Having ascertained the cost of the land, erection of buildings, and furnishing same for some 30,000 to 40,000 cases (which statistics showed to be the smallest number of cases to be provided for), the ratepayers who had to provide the money should be consulted. The cost, even if temporary buildings were to be provided, would run into millions for capital expenditure, and not far off one million per annum for maintenance of patients, interest on and repayment of loan. If this were undertaken by the Asylums Board their work would be doubled; the cost would mean that the present rate would be more than trebled. The question was one with which they all sympathised, but which was fraught with many and great difficulties, and to his mind was one which could only be solved by a Royal Commission.

Miss Hilda Joseph (Health Visitor to the London Jewish Board of Guardians) said she worked almost entirely amongst consumptives. She pointed out that this disease could never be wiped out unless advanced cases were removed from their homes. A large number of these patients lived with their families in one room. She came across many widows who

were suffering from phthisis, and whose husbands had died of this disease. Two of them showed signs of the illness two years after the death of their husbands. This surely meant that they resisted the infection throughout the long course of the disease, only to succumb to it when to the increased virulence was added the mental strain consequent on the death. Might not the health of these women have been saved could their husbands have been taken into some institution, say three months before their demise? She pictured the life of a consumptive who had no home, and who was turned out of lodging after lodging as soon as his landlady discovered the nature of his disease. No place was open to these poor wretches but the infirmary, and there many respectable working people refused to go. But what a breeding place for consumption their infirmaries must be! There, chest cases were placed side by side. Probably a patient might go into an infirmary with heart disease, emphysema, or bronchitis, and come out with the seeds of consumption. And then they talked of the expense being too great to build homes for the advanced cases! ! ! She also spoke a few words in support of the châlet form of sanatorium; especially was this a good method for adding to existing institutions. Part of the Nayland Sanatorium for poor patients (near Colchester) was built in this way; she paid a visit there last winter; the patients seemed most happy and comfortable.

DR. W. CHARROTT LODWIDGE (Surrey) showed a plan of a home for ten patients on the châlet system, with full administrative block connected to the units by covered ways; the whole, with the exception of the sanitary offices, raised on brick piers 2 ft. 6 in. from the ground. The units were divided into two rooms, each receiving light and air from south and west only. The home stood on a hundred square feet and could be built for £800; if five more blocks were added, giving accommodation for twenty patients, the cost would be £1,100, or £55 per bed. He also expressed a hope that municipalities would build homes on the châlet system, that early cases might have the great advantage of instruction in the hygienic management of their disease, and later ones isolation to prevent the spread of infection to their surroundings.

MR. A. SAXON SNELL (London) said Mr. Hall had well stated that in designing the building the "first in importance is the welfare of the patient, and second the convenience of the administration." He (Mr. Snell) was afraid that the convenience of the administration and the staff was considered too often to the detriment of the patients. He had in mind (and Mr. Hall would, he was sure, corroborate him) three or four modern hospitals where the ward blocks were connected by more or less enclosed corridors on all floors; an arrangement which greatly interfered with the movement of the air between the blocks, and one which would be at once condemned in the case of any such buildings carried out under the authority of the Local Government Board, the Admiralty or War Office, and even for prisoners. The sole reason was convenience of adminis-

tration and of the staff in going from one block to the other. But for this question of convenience of administration it was likely that the cottage or châlet system would be much more in favour, and he understood that even Dr. Squire admitted that these systems were theoretically more perfect, and he was certain the buildings could be carried out more cheaply. With regard to construction, there seemed to be an impression that the choice lay between brick and stone buildings and galvanized iron on timber; that was no doubt the case many years ago, but at the present day, with the great variety of building materials and forms of construction at our disposal, it should surely be possible to do something better, more sanitary, and more fire-resisting than was possible with timber framing, etc., and without greater cost. In connection with this they should look forward with much interest to the forthcoming exhibition of cheap cottage buildings to be held at Letchworth.

Dr. T. Orme Dudfield (Kensington) said he had not intended to take part in the discussion on the interesting paper to which they had listened, but he could not allow to pass, without remark, the estimates of Mr. Helby as to the number of patients for whom accommodation would have to be provided if the Metropolitan Asylums Board became the sanatorium authority, and as to the cost of sanatorium treatment. Mr. Helby said buildings would have to be provided for a minimum of thirty or forty thousand patients; that the capital expenditure on buildings, even if temporary, would run into millions; and that the maintenance of patients, interest on and repayments of loans would involve a charge of not far off one million pounds per annum; so that, if the Metropolitan Asylums Board undertook the work, the present rate would be more than trebled. He did not hesitate to characterise these statements as exaggerated in every particular. There were probably not so many consumptives of all classes in the Metropolis as Mr. Helby's estimate of the number of potential patients. A third of the sufferers, whom, in all, he (Dr. Dudfield) estimated at about thirty-one thousand, were chargeable to the rates, and the bulk of these, being incurable, would probably remain under the care of the Boards of Guardians. In July, 1900, Dr. Downes, the Medical Inspector (for Poor Law purposes) of the Local Government Board, ascertained that there were only four hundred persons in the Poor Law institutions who were in the early stage of the disease, and for whom sanatorium treatment held out a prospect of cure. For non-chargeable persons he (Dr. Dudfield) was of opinion that it would not be necessary to provide more than one thousand five hundred beds: say two thousand in all. The vacant hospital accommodation at the disposal of the managers would suffice for this number of patients, and for the present needs of the Metropolis. Assuming that patients remained in the sanatorium for an average period of six months, the managers would be able, without any large expenditure in adapting existing buildings, to deal with some four thousand cases in a year, two thousand at a time. It had been estimated that the maintenance should not exceed twenty-

five shillings per week per patient, including establishment charges, or about £130,000 per annum. Many of the patients would be able to do for themselves, and also assist their feebler fellow sufferers, so that a relatively small and inexpensive nursing staff should suffice. And if refuges for incurable cases should be provided, as a measure of public security, they must remember that, so far as the chargeable poor were concerned, the cost of maintenance need not be much greater than in the Poor Law infirmaries at the present time; while as regarded poor sufferers not in receipt of parochial relief, the estimated expenditure on them might well be regarded as an insurance for the protection of society and for the ultimate extinction of this preventible disease. So far, however, from having to provide for Mr. Helby's thirty to forty thousand patients, he thought it probable that, for some years to come, it would be found difficult to persuade as many patients in the early stage of the disease to avail themselves of sanatorium treatment as would fill the existing accommodation at the Board's disposal. Mr. Helby had frightened them with imaginative estimates of probable expenditure for effectual dealing with consumption. But what was the cost to the nation of this disease? the cause, every year, of nearly eight thousand deaths in London alone, the great bulk of them of persons over twenty years of age. It might, without exaggeration, be set down in millions. Dr. Darlington, the Chief Commissioner of the Health Department of New York, estimated the cost of tuberculosis to that city at not far short of five million pounds sterling per annum, and surely it could not be less to the far greater city of London. So that the proposal to make the Asylums Board the Sanatorium Authority, and to provide to whatever extent might be necessary for the treatment of curable cases, and the safe keeping of incurable sufferers, had for one of its many grounds of justification the merit of economy. No one begrudged the cost of dealing with scarlet fever and diphtheria, great as it had been, whether as regarded capital expenditure on buildings or annual charge for maintenance of patients. But those diseases had proved fatal last year, in London, to less than a seventh of the number of deaths from consumption; and only twenty-one of the deaths had been of persons over twenty years of age, not less than ninety per cent. of them being of children under five years of age. Precious lives to lose, doubtless; but not comparable in value to the community, from the economic point of view, with the lives of the adult victims of consumption. He concluded by saying that he had in these few and unintended observations confined himself entirely to the money aspect of the question, in the belief that if such statements as Mr. Helby had made went forth unchallenged, the prospect of seeing sanatoria established, within his own days at any rate, would be small indeed.

ON THE STERILIZATION OF EFFLUENTS,

With special reference to Oysters and other Shell-fish, and to Watercress Beds.

By SAMUEL RIDEAL, D.Sc. Lond., F.I.C.
(FELLOW.)

WE may divide our subject into three sections:

Part I. Is sterilization necessary?

Part II. If necessary, by what means can it be made practicable?

Part III. Where not practicable, are there alternatives?

PART I.

Many earlier efforts, with an immense expenditure of thought, labour, and money, were directed towards the complete sterilization of *crude sewage*, and repeated failures compelled the conclusion that the object was impracticable on a large scale. Later when it became acknowledged that the attempt was in general on the wrong lines, and that biological change was on the whole the most economical and efficient means of purification, and should be encouraged and not inhibited, the bacterial flora of an effluent which was inoffensive to sight and smell and conformed to certain chemical standards, excited little attention. This attitude was generally right, as I have frequently contended that it is no part of a sewage scheme to convert sewage into drinking water, and that where the water of a river must be used for drinking, it is always necessary to purify it by efficient filtration or by other means. At the Exeter Local Government Board Inquiry in 1897, it was suggested that whilst cultivating the bacteria necessary for the destruction of the organic matter in sewage, the pathogenic organisms might not only survive but possibly multiply in a septic tank, and cause the effluent to be dangerous to health. Experiments by Dr. Sims Woodhead and by Dr. Pickard went far towards establishing, however, that none of the organisms found in the tank effluents were themselves capable, in the quantities present, of setting up morbid changes. Typhoid bacilli introduced in large numbers into the tank liquid rapidly disappeared, and still more quickly in the filters, show-

ng that the environment was unsuitable; and investigations on the Thames and elsewhere proved that pathogenic organisms did not ordinarily survive in rivers.

Later Prof. Boyce showed that filtration had a marked effect in keeping back B. enteritidis sporogenes: it was not discovered in the filter effluents at Chorley and Oldham. In the effluent from the septic tank installation at Manchester, it was only found when a large quantity of the liquid was examined. He showed that B. coli diminished during the stay in the tank, and concluded that the septic tank liquid was inimical to B. coli, "and therefore to the other more delicate pathogenic bacteria." Experiments of my own at Caterham proved that nitrifying filters removed 98·5 per cent. of the coli organisms, and all or nearly all of the enteritidis. Fuller states that in America sewage, filtered intermittently through sand, contains only about one per cent. of the bacteria present in the raw liquid.[1] So that we were justified in concluding that effluents from an efficient bacterial treatment were, with the limitations I have above indicated, perfectly safe to discharge into rivers, and that the greater the aeration and nitrification, the less the possibility of survival of pathogenic organisms. Dr. Houston's conclusions in his Report to the London County Council in October, 1899, that the effluents from the experimental beds at Crossness and Barking "could not be reasonably assumed to be more safe in their possible relation to disease than diluted raw sewage," related to beds worked in the manner described in the report, from which we gather that nitrification was poor in all cases, and that the object was simply the one that was ordinarily sufficient to produce an effluent that did not create a physical nuisance.

Judged from a bacterial standard, and sometimes from a chemical one, there is not a river whose waters are safe to drink without purification, and my contention many years ago that a good effluent frequently *improved* a river has been recognized as true, and is conceded in the report of the Royal Commission on Sewage.[2] Therefore there does not seem to be much advantage in insisting, in the language of the Commission, on the "fundamental difference between the discharge of effluents into drinking-water and non-drinking-water streams." In most cases it is only practicable, in the majority it is alone necessary, and in all cases it should be compulsory, to carry the purification of sewage to a stage when, in my words at the time mentioned, "such factors as time, light, volume of oxygen, and various life in the river will be more than sufficient to

[1] For references to literature see end of paper.

deal with the effluent," leaving, in the instance of "drinking-water streams," the removal of the reduced number of bacteria to the water companies, with, as I have indicated elsewhere,[3] a final line of defence in domestic sterilization.

The suggestion that local authorities should *in general* be further hampered by increasing their existing burdens in treating sewage, so as to produce effluents equal to drinking-water, is obviously absurd and unjust. The means by which sterilization of effluents can be effected when necessary will be presently described.

Much sewage is still, however, locally discharged without any treatment, or with only screening or a rough sedimentation. The Rivers Pollution Act, 1876, restrains such a practice as regards "rivers, streams, canals, lakes, and watercourses, other than watercourses at the passing of the Act mainly used as sewers and emptying direct into the sea or tidal waters" (section 20). Under the provisions of this Act, and the supplementary one of 1893, damages have been obtained and injunctions granted on a large number of occasions. But the working on the whole has not been satisfactory, and the Royal Commission on Sewage observes[4] "At an early stage of our investigation we were struck by the fact that in many parts of England the pollution of rivers goes on unchecked, notwithstanding the fact that the Rivers Pollution Prevention Act has been on the statute book for over a quarter of a century, and in our Interim Report we deemed it necessary to state that the protection of our rivers is a matter of such grave concern as to demand the creation of a supreme rivers authority." They give, further, an outline of the powers and duties of such a central authority and of proposed River Boards.

An interesting case, in which damages were obtained on account of the destruction of fish and water-plants by the discharge of crude sewage into a river, was decided in the High Court of Justice in December, 1904. The Earl of Harrington and others, owners of Elvaston Castle and estate, situated on the Derwent five or six miles below Derby, brought an action against the Corporation of that city to restrain it from polluting the river so as to cause a nuisance, and to recover damages. The plaintiff had found it necessary to cut off the intake from the river to a private lake, as from 1885 to 1897 the fish in the river and in the lake died, and even the water-plants were killed, while the water itself became so fetid as to affect the residents in the neighbourhood. The judge decided that it was settled by authority that persons who had discharged their sewage for more than twenty years had obtained a prescriptive right, and that therefore it was impossible to grant an injunction which should extend to this

class of sewers. Further, the plaintiff had in 1898 obtained from the county court, under the Rivers Pollution Prevention Act, an order on the Corporation to abstain from polluting the river, and the works necessary to comply with this order were still in progress and the time-limit unexpired till January 1st, 1906. For these reasons the judge refused the additional protection of an injunction. He, however, found the defendants liable in damages "for that which they had done, but not for that which they ought to have done, but have failed to do." As this was a "continuing injury," section 1 of the Public Authorities Protection Act, 1893, limiting the damages to a period of six months, did not apply, and they were recoverable up to the period of six years defined by the Statute of Limitations.

In certain estuaries the polluted water is carried up and down by the tide and is only slowly cleared out to sea; and yet tidal waters, as will be seen by the quotation we have given from the Rivers Pollution Act, are exempted from its operation: as a consequence raw sewage continues to be discharged from a large number of sea-coast towns. The risks to health, especially from the contamination of fisheries and shell-fish layings, claimed early scientific attention. In India it has been held from ancient times that uncooked shell-fish are a cause of bowel affections and even of cholera. In 1880 Sir C. Cameron pointed to the possible relation of typhoid in Dublin to the consumption of specifically polluted oysters. Sir R. Thorne Thorne, in the Local Government Board Report for 1894, expressed his conviction that the distribution of shell-fish from certain centres had been concerned in the diffusion of cholera over a somewhat wide area in England. In the same year Dr. Newsholme commenced his investigations as to the connection of typhoid at Brighton with sewage-polluted shell-fish, and afterwards proved that the percentage of cases due to this cause was in 1894, 1895, 1896, and 1897, 38·2, 33·9, 31·8, and 30·7 respectively,[5] and that at least one third of these cases are due to mussels.[6] Dr. Nash in 1900 obtained clear evidence that a severe outbreak of typhoid fever at Southend was originated by infected cockles.[7] These had been obtained from a sewage-polluted creek in another district; had been scraped up with an ample amount of mud attached, then washed on a sieve in the creek water, and partially cooked by being plunged into an open copper containing very hot water. In a few minutes, when the shells opened, the cockles were removed, the shells separated by sifting, and the fish either sold at once or pickled in brine for transport.

The important points are that the usual cleansing is delusive, and the parboiling commonly practised is no protection. Dr. Thresh, in an ex-

periment with these cockles, washed them twice with pure water and then plunged them into boiling water. At the end, living sewage bacteria were present in the liquid draining from them, a result confirmatory of conclusions previously arrived at by Dr. Klein, working with oysters, cockles, and mussels, and with typhoid and cholera organisms, who moreover found that the organisms remained even when the infected water had been replaced for three days by clean sea water, and that they actually increased in numbers within the bodies of the shell-fish.[8] Dr. Nash also remarks[9] that inquiries should not be limited to the *eating* of shell-fish, but should extend to the *handling* of such from suspicious sources, since germs can easily be carried from the hands to the mouth.

It is rarely possible to extend a pipe line across the foreshore, and to discharge the sewage into deep water, even at the lowest ebb of spring tides, at a point where the tidal current has a seaward set, as has been lately accomplished with great expense and difficulty by the Llandudno Urban District Council. Here it was necessary to cover the pipes with a great quantity of stone for their protection, and the original estimate of cost was greatly exceeded. Where the geographical conditions are not so favourable, as in estuaries and also on the almost unbroken shore-line of many coasts, there is almost a certainty that the sewage will be retained in the neighbourhood, or will be brought back by eddies and currents even if carried out some distance, as has happened at Brighton. In America, where the infection of oyster-beds by sewage has been a question of importance for the last eleven years, the great majority of cities, according to Mr. Fuller,[10] discharge untreated sewage. Thus, out of an urban population of 28 millions, $6\frac{1}{2}$ millions discharged raw sewage into the sea, harbours, or estuaries, $20\frac{1}{2}$ millions into inland streams or lakes, and only about one million had sewage purification works.

The proofs of the connection between polluted shell-fish and typhoid are clear and numerous, and have been summed up by Dr. Newsholme in his paper at the Glasgow Congress,[11] and also in the Fourth Report of the Royal Commission on Sewage, Vol. I., p. 15. In the careful surveys of the gathering grounds of England and Wales in 1894 and 1895, and of Ireland in 1903, conducted for the Local Government Board, it became evident that a number of them were liable to invasion by recent sewage. The question of discharge into tidal waters came into wide public notice in 1903 in connection with serious illness following mayoral banquets at Winchester and Southampton, which illness was traced to Emsworth oysters. Legislation had been for years asked for by a number of local bodies, to include prohibition of the laying down of shell-fish in sewage-

lluted water, or other dangerous localities, and the protection of those d down in hitherto unpolluted places.

The whole subject was therefore dealt with as urgent by the Royal mmission in their Fourth Report, 1904. They concluded that (Vol I., 11) "generally speaking it may be said that the Statute Law does not ohibit the discharge of polluting liquids into tidal waters," and from the ss of evidence they collected, gave official confirmation to facts of which iers, including myself, had long been aware, that sewage from towns d tidal rivers on the coast is usually discharged in an unpurified condin, that injuries to health and to fisheries may be thereby caused, and it some alteration of the law was necessary. Page 15 states that in ny layings of oysters the sewage can reach them in a very short time er its discharge, and that organisms of intestinal origin can be taken up the shell-fish and remain alive in them for several days, and can proce enteric fever and other diseases.

In the evidence it was urged by Dr. Savage[12] that every endeavour ould be made by local authorities to prevent typhoid bacilli or other hogenic organisms from gaining access to sewage, by sterilization of the reta of patients. He admitted, however, that in the large discharge of hoid bacilli in the urine during prolonged convalescence, there would almost insurmountable difficulty.

We gather, therefore, from the Royal Commission's Report that rilization of effluents is necessary:—

1. Where shell-fish or vegetables commonly eaten raw are liable to be ected, provided it is necessary for them to lie in such situations.

2. Where disease organisms are discharged in large numbers, as in the tance mentioned above, and in fever hospitals.[13]

3. Where the effluent is discharged into streams from which water is sequently taken without proper purification. I have already comnted sufficiently on this point.

PART II.

Y WHAT MEANS CAN STERILIZATION OF EFFLUENTS BE EFFECTED?

In their Third Report, issued more than two years ago, the Royal nmissioners state that they were then "continuing the investigations erred to in our Interim Report (1901), for the purpose of ascertaining ether it is practicable to destroy those micro-organisms which are nmon to sewage effluents, and which may be dangerous if the effluent

flows into a river from which water for drinking is obtained, and we are generally considering what measures may be desirable to lessen dangers so arising" (p. 29).

It was hoped that the Commission would by this time have given some information as to processes of destroying micro-organisms or sterilization of effluents on the large scale, but although evidence on the subject was given before them by Drs. Klein, Thresh, myself, and others, and one of their references was as to what remedies were practical and available for injuries caused by sewage, sterilization finds no further mention in their conclusions. The nearest approach is in their Fourth Report, Vol. I., p. 20, under "Remedies Suggested," where the proposal that *all* sewage should be purified is met by two objections: non-necessity, and non-efficiency.

Non-necessity, because there are "many cases where shell-fish are not concerned . . . and to require purification in all cases would lead to the waste of large sums of money."

Non-efficiency, because they consider that no treatment at present in use can be relied on as safe.

They seem to have ignored the point that sterilization of a *partially purified* effluent *when necessary* was possible, and had been achieved in several places without ruinous expense. And yet the keynote to this idea had been struck shortly before in the Report of the Local Government Board for Ireland, 1903, p. 7, in the phrase, "Short, however, of the sterilization of sewage effluents discharging in the immediate vicinity of shell-fish beds, no other form of treatment at present in use is likely to be effectual in destroying or removing, although it may succeed in reducing, the number of pathogenic germs."

Heat is an obvious means of sterilizing, and was tried in a large number of early inventions for sewage disposal, mostly connected with schemes for the utilization of the ammonia evolved. Dr. Klein in his evidence[14] mentioned an apparatus that had lately been on trial for effluents, but no further notice seems to have been taken of it. One difficulty is the heavy crust that is deposited by sewage liquids when heated, and another is the action on iron.

It has long been known that sewage liquids can be rendered nearly or quite sterile by means of *lime*, but the quantity required is large (60 or 70 grains per gallon) and produces a very heavy sludge; moreover, lime shares with other precipitants the objection that the bacteria in a short time rise from the sediment, and the liquid soon becomes again putrid. A great number of other agents that have been tried or proposed are pre-

ıded by the expense. On the question of acids, and also on that of ıt, I shall speak later.

Ozone has been successfully used in Belgium, France, and Germany · purifying foul river and canal water, and therefore seems worthy of al in this country for effluents.[15] Dr. Van Ermengem and others proved ıt it sterilized at a reasonable rate canal and other waters *which had been eviously filtered.* At the Martinikenfelde installation, near Berlin, the ginal water from the river Spree showed 100,000 to 600,000 organisms r cc., the effluent after ozone was sometimes sterile, and never contained ıre than two to nine organisms per cc. The Commission who approved the apparatus and its results at Lille reported that only a few spores of ghly resistant and harmless B. subtilis were left, and that these dis-peared in about 12 hours' storage. One objection to ozone is its sparing ubility.

Chlorine and chlorine oxides are as powerful as ozone, are easily soluble, d generally more manageable, and I have always considered that they ıuld not be costly when used as "finishers," that is, after the main part the organic matter has been removed or reduced. In the Maidenhead periments, conducted by Prof. Robinson, Dr. Kanthack, and myself, a d effluent was treated with one or two parts of chlorine per 100,000 th very satisfactory results as regard bacteria. The process was dis-ıtinued at Maidenhead, but was adopted in 1899 at Havana, Cuba, for eets, sewage, and harbour: it was stated that it kept the city practi-lly free from yellow fever. The Hermite method, using electrolysed sea ter, is well known, but did not always sterilize, and the solution rapidly teriorated.

Lately I have had a further opportunity of investigating the application oxy-compounds of chlorine to sewage treatment, and I have made a long ies of experiments on a sufficiently large scale to satisfy myself as to the acticability of the process. Guildford Sewage Works were selected for ese trials, as all classes of effluents were there available for investigating e results of the treatment. The electrolytic chlorine used in these sts was generated from brine in a special form of electrolyser owned by e "Oxychloride" Company, which claims certain economic advantages er the earlier types of apparatus, into which it is not the province of is article to enter.

Raw sewages from this and other places, and effluents from septic nks, primary, secondary, and tertiary filters, were treated with the solu-ın under varying conditions to ascertain its efficiency as regards (1) ıtrefactive organisms and (2) sewage organisms comparable in origin

and vitality with those which cause typhoid fever and cholera. The tests were also directed to secure such freedom of the effluent from suspended solid material as would prevent the formation of mud banks, and from organic matter in solution as to render it impossible for it to become putrid when subsequently mixed with water.

Although these processes are commonly called chlorine methods, it must be remembered that the purification is mainly effected by oxygen liberated in an active state through the action of chlorine on water, the proportion of the element that can serve in this way being termed "available chlorine," as distinguished from that present in chlorides such as common salt, which is almost inert. The amount of oxygen liberated by chlorine itself, as in the addition of chlorine water or the gas, is doubled when it is present as hypochlorite, and my experiments indicated that the oxygen value of the electrolytic solution, containing chlorine oxides and other compounds, was still greater. I have, however, always stated the strength of the addition in parts of available chlorine (*av. Cl*, as ordinarily measured by arsenious acid), added to 100,000 parts of sewage or effluent. The actual volume of oxychloride used would depend upon its strength: at Guildford the machine gave a solution containing 0·2 to 0·5 per cent. of available chlorine.

I have elsewhere pointed out the great variations that occur from time to time in sewages, and the consequent necessity for systematic analytical control of the methods of purification.

By daily bacterial and chemical analyses I was enabled to establish at Guildford, in reference to the amount of reagent required, an easy practical guide that may be applied to other places. The various liquids agreed in showing a very nearly constant relation between the five minutes' oxygen-consumed figure, representing the amount of the agent that would be at once taken up by the organic matter, and the quantity of the oxychloride that was needed, so that there should be an excess capable of killing the bacteria. The five minutes' oxygen multiplied by 1·7 gave the amount of available chlorine required in parts per 100,000, and the strength of the solution being determined the proportion to be added is easily calculated.

Raw Sewages.—The following, in a strong sample, is a type of the results (Exp. 34)*:—

The untreated sewage had a very foul odour: it gave in parts per 100,000, Cl in chlorides 18·6, oxygen consumed in five minutes 4·14, in

* These numbers refer to the laboratory records of the experiments made at Guildford.

½ hours 18·8, free and saline ammonia 7·2, albuminoid 2·4, B. coli a nillion per cc. The addition of three parts of available chlorine per 00,000 reduced the coli to less than 1 per cc., and spores of B. enteritidis porogenes to less than 10 per cc. after 4¼ hours' contact. With five to even parts of av. Cl, negative results were obtained for both these rganisms with 5 cc. after 4¼ hours' contact. The total number of rganisms was reduced by three parts of av. Cl from several millions to 0,000, by five parts to 20, and by seven parts to 10, per cc.

Incubation tests by dilution with nine volumes of river water and eeping at 20° C.: three parts av. Cl, very slightly foul after three days; ve and seven parts av. Cl, inoffensive after four days' incubation.

In another case 3·7 parts per 100,000 of av. Cl added to raw sewage educed the coli from over a million per cc., so that none were found in ne cubic centimetre, the enteritidis spores from over 1,000 to less than 0, and the total organisms from 23,200,000 to 540 per cc.

Experience showed that considerably smaller quantities of the solution ould be used with sewages of average strength, and within limits a longer eriod of treatment allows of reduction in the amount of available chlo-ine. Taking the raw sewage as it entered the works, it was found racticable to treat it direct with oxychloride in place of chemical pre-ipitants in settling tanks. Much less sludge was produced than by rdinary chemical treatment, and neither sludge nor effluent readily de-omposed. The expense of chemicals, power for the mixers, and labour n slaking lime and in other operations, must thus be balanced against the ost of the sterilizing solution. The effluent from the latter was fit for lischarging direct on to land, and the final effluent from the underdrains vas suitable for passing into any body of water. The sludge when spread ipon land remained sweet as compared with that from ordinary chemical reatment.

A large number of trials in which oxychloride was added in varying imounts showed that nearly a constant proportion, about sixty per cent., of he available chlorine was taken up almost immediately, while about forty er cent. remained and declined more gradually, pointing distinctly to the hlorine existing in the reagent in two forms, one which acts at once on eadily putrescible matter, the other remaining to attack bacteria and esistant organic substances. The former predominates in a freshly-made solution, and is absolutely required for crude sewages and bad effluents; the main amount is at once taken up by dead organic matter. This occurs, as we know, in all oxidation processes, and necessitates a heavy consumption of the reagent when used on raw liquids.

All the raw sewages were greatly improved by the treatment, the smell being destroyed, and the bacteria per cc. reduced from many millions to ten or twenty, and sometimes to none.

Septic Tank Effluents.—It was found better in most cases to deal with the sewage after it had undergone a preliminary septic treatment, since thereby it was carried a stage further in its resolution. But the most important reason was that vegetable masses (and still more, solid excreta) are, as is well known, very difficult to sterilize by any means, because there is little penetration; and the difficulty is encountered in the disinfection of the stools of fever patients. Anyone who has worked with the microscope will have seen that living organisms collect in much larger numbers in the organic flakes than in the liquid. A fault of the Hermite process was that it failed to sterilize the interior of solid fæces, and the trials at Nice illustrated a point now well established, that an attempt to disinfect hinders or prevents the natural bacteria from breaking down organic débris, therefore the disinfectant should be applied *after* the breaking down. In the septic tank the suspended substances are reduced to a much finer state of division, and the bacteria are readily attacked. I found, somewhat unexpectedly, that ammonia did not react with oxychloride in the dilutions employed in treatment, so that the solution would not be destroyed or wasted by the ammonia produced in the tank. Urea also did not interfere with the first action of oxychloride, but would tend to remove any trace of the reagent remaining after the process.

The simple treatment of a raw sewage by means of a septic tank and then addition of the solution, would be sufficient for a large number of cases where the organic purity was of less importance than the removal of pathogenic organisms, as in localities close to shell-fish gathering grounds or watercress-beds. For both of these, and particularly for vegetables, complete organic purification might be a disadvantage, as depriving them of food. In places where open septic tanks had been objected to on account of suggested nuisance, closed tanks could be adopted of a rather smaller size than usual, the solution being added in a covered carrier with baffle plates as the effluent passed out, with a certainty of removing all objectionable odours. If existing tanks are divided by a party wall into two unequal chambers; in the first, of say 20 hours' dry weather capacity, the anaërobic preparation could go on as at present; while in the second, of say four hours' capacity, the chlorine solution would be added in sufficient quantity to cause the suspended solids to subside in a more or less sterilized condition, and the effluent to be free from smell and objectionable organisms. The cost and space required for primary, secondary, and ter-

:iary beds would in this way be saved. I believe that the method, in the :ase of seaside towns and those discharging into estuaries, would greatly :ontribute to local healthy conditions, and would insure the absence of ınsightly sewage matter on the shores.

In the septic tank effluents at Guildford the total organisms were ?½ to 4½ millions, the coli 100,000 to a million, and the spores of B. enteri-;idis sporogenes 10 to 1000 per cubic centimetre. After the addition of ıvailable chlorine (regulated by the five minutes' oxygen consumed) from ?·5 to 4·4 parts per 100,000, and a contact of from one to four hours 'experiments 12 to 59), the coli and the enteritidis spores were absent 'rom 1 cc., and in most cases from 5 cc. The total organisms were very ;reatly reduced: they were not regularly counted, as of less importance, ›ut on four occasions they had been lowered from the many millions ›riginally present to 20, 110, 140, and 600 per cc. Even the last number s below that usual in rivers.

The anaërobic organisms, which have a special interest at this point, rere found (Exp. 59) to have been reduced from an average of 2½ nillions per cc. in the untreated septic effluent, to 200 after 1½ hours' ontact with the chlorine solution, and 150 per cc. after 3 hours.

Incubation tests, by mixing with three parts of the river water, showed hat the untreated effluents had a smell at first, which progressively ncreased, while the dissolved oxygen rapidly disappeared; but the mixture rith *treated* effluent kept sweet, and the dissolved oxygen did not sensibly .ecrease in twenty-four hours, and did not fall below 3 cc. per litre in the losed vessel for three or four days.

A feature common to all oxidation treatments, the rapid disappearance f the reagent at the first onset, suggested that there might be an advan-age in adding the solution in successive portions. Thus, when three parts f available chlorine were required (Exp. 49), one part was added at the eginning, one part in 1½ hours, and a third part in another 1½ hours. ıt the end the coli and the enteritidis spores were less than one per 5 cc., nd the total organisms were less than 110 per cc.; the incubation test 'as satisfactory. Some available chlorine was left in the effluent, there-›re (Exp. 50) the third instalment of oxychloride was reduced to 0·5 part, ıaking 2½ parts in all; when the coli and enteritidis were absent in 5 cc., nly a trace of available chlorine was left, and the incubation tests were qually good.

This modification, however, involves a longer time, and it is apt to :ave a residue of available chlorine, requiring a storage of eight to

eighteen hours for its disappearance. Where such storage is possible it tends to a complete sterilization of the liquid.

A very important fact was elicited by estimating the dissolved oxygen at different periods of time in a mixture of river water and septic effluent, the proportion of three parts of the former to one of the latter being chosen. In the case of untreated effluents, when tested at the end of 19 hours the oxygen had entirely disappeared; while with the treated, after an initial fall, it rose, so that at the end of three days it was higher than at first, and almost equal to the river water. It remained throughout well above the quantity essential to fish-life. This is a larger proportion of effluent than in practice would be discharged into river waters. The reason of the result is that owing to the destructive action of the treatment on the putrefactive bacteria of the sewage, the oxidizing organisms become more numerous than the putrefying, so that the river does not foul. Two or three days, the time of the incubation tests, brings the whole liquid down to the sea.

It will be seen, therefore, that a greater freedom from coli organisms and from enteritidis spores than in many large public supplies of drinking-water, was not found difficult to attain by the treatment, even with the strong sewages met with at Guildford.

Primary, Secondary, and Tertiary Contact Beds.

In a large number of experiments with the contact beds at Guildford I found that, as in the different stages the organic matter decreased, the amount of available chlorine consumed almost immediately was correspondingly lessened, and the proportion of 1 to 1·7 between five minutes' oxygen and available chlorine still remained a guide. To show how far these effluents required sterilizing, I subjoin my maximum and minimum bacterial enumerations in all the stages :—

Organisms per cubic centimetre.

	Raw Sewage.	Septic Effluent.	Primary Effluent.	Secondary Effluent.	Tertiary Effluent.
Total organisms.........	About 23 millions	2½ to 4 millions	4½ millions	1 to 2 millions	10,000 to 700,000
B. coli......................	1 to 10 millions	100,000 to a million	100,000	10,000 to a million	1,000 to 10,000
Spores of B. enteritidis sporogenes	100 to 1,000	100 to 1,000	20 to 100	10 to 100	10 to 100

It will be seen that in this case comparatively little improvement is made in a bacterial sense after a certain stage, although a chemical standard may be attained.

The primary effluent at Guildford required (Exps. 7 to 15) 2 parts of available chlorine per 100,000 to reduce the coli from 100,000 per cc. to less than 1 per 5 cc. after 40 minutes' contact, and the enteritidis spores from 20 per cc. to *nil* in 5 cc., after 2 hours' contact. After being kept for 4 days the untreated had a strong sewage odour, the treated remained odourless.

In the secondary effluent, with 1·06 parts of available chlorine (Exp. 11), coli was reduced from 1,000,000 per cc. to none per 5 cc.; enteritidis spores from 100 to 1,000 per cc. to none in 5 cc.; and the total organisms from 1,000,000 to 40 per cc. Incubation 48 hours: untreated, sewage smell; treated, inodorous.

In the tertiary effluent the small amount of ·25 part of available chlorine reduced the coli from over 10,000 per cc. to *nil* in 5 cc. in 1 hour, and the enteritidis spores to less than 1 per cc. in 4½ hours. (Expt. 47). ·5 part av. Cl reduced the coli from over 10,000 per cc. to less than 1 per 5 cc. in 30 minutes, and the enteritidis spores to less than 1 per 5 cc. in 4½ hours. The incubation tests gave after 4 days a distinct odour in the untreated, none in the treated. A decided chemical improvement was shown by the analyses. The treatment caused an increase of the free, with a decrease in the albuminoid ammonia, showing a breaking down of the organic matter.

The effect of the treatment when drinking water had been infected by an effluent was also investigated. An average sample of the untreated tap-water used contained 90 organisms per cc., and coli was present in 4 cc. After treatment with ·075 part of available chlorine (Exp. 54), the total organisms were reduced in 5 hours to 14 per cc., and coli was then absent from 20 cc. Another portion was mixed with $\frac{1}{500}$ of its volume of tertiary effluent, and ·08 parts of available chlorine added (Exp. 58). The infected tap-water had contained 100 coli per cc., but after 1 hour's action of the oxychloride there were none present in 20 cc. and this condition remained through a channel more than 100 feet long. The water after standing did not retain any taste or smell of the treatment, and the chloride as measured by chlorine was only increased by 1·75 to 2 parts per 100,000, which is obviously of no significance. It is remarkable that, as seen above, the tap-water at this particular time actually contained more total organisms and more coli than remained in the sewage after the chlorine treatment, so that the extraordinary result

was realised of obtaining at the sewage works an effluent which had a greater bacterial purity than the town water supply.

The general conclusion was that, with a good effluent, *sterility* can be insured by the addition of about 5 parts per 100,000 of available chlorine. If removal of coli and enteritidis only is aimed at, one-tenth of this amount (=·5 part), or sometimes even less, is sufficient, as would be the case in a discharge near shell-fish gathering grounds, into watercress-beds, or into rivers that are used as a source of supply by water companies.

Absolute sterility.—Even the tertiary effluent contained some thousands of spores per cc., of which forty to fifty are capable of resisting the temperature of boiling water for several minutes; therefore I soon found that absolute sterility was not practical, not merely on account of the cost of the large quantity of disinfectant required, but also because the residual disinfectant would be inadmissible in an effluent. For this reason it became necessary to discover what the highly-resistant organisms were, and particularly whether they could be injurious. I found that they were constant in character throughout the sewages and effluents, and consisted of a group of bacteria of the hay-bacillus type, non-pathogenic, not producing smell, and of great assistance towards the resolution of organic matter. Absolute sterility, therefore, is not required, and, if attained, would not be maintained.

Sterilization by Acids.—The large majority of bacteria, especially the pathogenic forms, have a preference for neutral or slightly alkaline solutions, and it has long been known that in culture liquids they refuse to grow, and die, even with small amounts of acid. Koch first noticed the fact with regard to the cholera organism, Kitasato showed that it was killed by dilute sulphuric or hydrochloric acid in a few hours, and A. Stutzer found that ·05 per cent. of sulphuric acid was fatal in fifteen minutes, ·02 per cent. in twenty-four hours. Ivanoff, with ·04 to ·08 per cent. sulphuric acid, destroyed cholera organisms in Berlin and Potsdam sewage. In the Liernur process, and in that of Beck and Henkel's of 1901, sewage is sterilized by sulphuric acid. The successful use of acids in disinfection is very old, and was limited by inconveniences, which, however, would not affect their employment for liquids in the very dilute state shown above to be effective. Stronger solutions of mineral acids have long been used in medicine, and have probably owed a great part of their efficiency to their action against bacteria. Organic acids also possess this property, as in the example of the ancient employment of vinegar, and there is a great probability that the almost universal practice of using vinegar or lemon juice with salads, shell-fish, or other foods, has

been a piece of natural selection founded on experience of the danger of intestinal or parasitic diseases originating from such sources. I may quote an experiment of my own. I added B. coli to a good table vinegar (5·3 per cent. acetic strength), and to the same diluted to twice and to ten and fifty times its volume with distilled water. In the weaker two liquids the bacillus was alive after forty minutes, in the half strength it was killed in fifteen minutes, and in the undiluted vinegar in five minutes. When not killed it would be enfeebled by the acid.

Vegetable acids are of course too expensive for treating effluents, but cheap mineral acids, like sulphuric, are practicable and efficient in cases of serious infection. I have found[16] that ·072 per cent. of sulphuric acid is effective against typhoid organisms in fifteen minutes: Kitasato practically agrees, as he finds ·08 fatal. In sterilizing with acids, an additional quantity must be added to balance the alkalinity of the liquid: in sewage this ranges usually between ·2 and 60 parts per 100,000, and 4 *grammes* of sulphuric acid per gallon is sufficient for causing the death of the typhoid bacillus in the usual drainage from an isolation hospital or other infected area. The free acidity would soon be neutralized when such liquid became mixed with fresh sewage that had not been similarly treated, as the infected sewage would be only a small portion of the whole. B. enteritidis is killed by this reagent, and Sp. choleræ succumbs with great rapidity. It also kills intestinal worms and their ova.[17] These observations suggest that it should be added to the water in which vegetables are washed, especially those which are to be eaten as salads: in tropical countries these are habitually fertilized with fresh manure, which may be often infected. For many purposes, instead of the corrosive sulphuric acid, I have succeeded in using bisulphate of soda, which is portable and not dangerous,[18] and is added in the proportion of 15 grains per pint, ·17 per cent.

I do not know that disease has been conclusively traced to vegetables which have been grown in connection with sewage or effluents; in fact, English experience with the land plants grown on sewage farms has pronounced them to be safe. Wurtz and Bourges[19] grew cress, radishes, and lettuce in earth watered with various pathogenic cultures, and found the bacilli on the stalks of the plants at a height of even a foot above the ground. Potatoes infected with anthrax and planted were allowed to grow: the bacillus was recovered from the stalks as long as 101 days afterwards. It is noted that out-of-door conditions, such as the cleansing effect of rain, and the bactericidal action of sunlight, are different from those in the laboratory. But in heavy storms mud may be splashed to a

great distance, and so contaminate the leaves or fruit. A French Commission was appointed in 1902 on the subject of possible dangers from raw vegetables and fruit grown on sewage farms, and recommended to the Comité d'Hygiène Publique that vegetables and fruit intended to be consumed in the raw state should not be allowed upon land fed with sewage.

Watercress, being at times almost immersed, may become coated with polluted lime-crusts and not be easily cleaned by washing. The London County Council's report of February 7th, 1905, on watercress-beds supplying London, concludes that, "having in view the extent to which careful washing eliminates impurity, it may be assumed that there is under existing circumstances no material risk in consuming the watercress supplied from the majority" of these beds. "Objection must, however, be taken on topographical, chemical, and bacteriological grounds to certain beds, especially those in class D" (where there was "actual gross pollution"), "and effort should be made to prevent the consumption of watercress from these beds in their present condition."

The industry is a large one: Sir Shirley Murphy estimates the annual consumption of watercress in London at 1,500 tons—and this appears to be one of the earliest, if not the first, systematic official report published in Britain on the subject, therefore the classification adopted requires some comment. The beds, 120 in number, with areas from less than ¼ to 40 acres, comprising all those within 50 miles known to supply the London market, are grouped in four classes, A, B, C, D, according to the inspectors' report of "the degree in which, according to their estimation, there was risk of pollution." In most cases the waters were examined by the chemist, who gives his own classification according to the albuminoid ammonia as follows:—

Group.	No. of Samples.	Nitrogenous Organic Matter.
A	53	About the same as the filtered (Thames-derived) London supply.
B	47	About the same as in the Thames at Hampton and Sunbury above the intakes.
C	22	Large in quantity.
D	7	Very large in quantity.

The oxygen absorbed was determined, but does not seem to have been taken into account. The analytical figures are not published.

Only thirteen samples of water were submitted to the bacteriologist:

hese he arranges in eight classes (only seven are defined), by the number f "non-liquefying, gas-forming coli-like microbes," and considers that lasses IV. to VIII., containing coli in 1 cc. or less, are to be condemned acteriologically. It will be seen that our Guildford chlorine-treated ffluents would have easily passed this test.

It is notable that the two worst samples, III. and XI., were effluents rom sewage farms, and contained 10,000 coli-like microbes per cc., and nteritidis spores in ·1 cc.

We regret that all the samples were not thus examined, as chemical nalysis alone is of no value in fixing whether an effluent is dangerous to a vatercress bed.

This is well seen in Dr. Clowes' report, where his classification, based n the chemical figures, condemns waters as grossly polluted after land reatment, which examined bacteriologically contained less organisms of ewage type than "surface drainage from a farmyard and cesspool overlow," which, on analysis, gave better results.

Dr. Houston concludes that "no ordinary amount of washing could be elied on to rid cress grown in polluted waters of *all* undesirable microbes." t was of great moment to ascertain whether pathogenic organisms could xist and multiply in the *interior* of plants, and this was partially studied y analogy with B. coli. The results on the whole were against the ypothesis, as Sir Shirley Murphy notices in his summing up, although Dr. Houston lends some probability to the idea that the leaf and stalk of ress "may foster undesirable organisms." Even if it were true that athogenic infection of the interior of living plants were occasionally ossible, I believe that in the acid washings I have described above, the cid, being more diffusible than the bacteria, would reach them in sufficient quantity to destroy them, and then be removed in the subsequent vashing with water. A point in favour of the success of cleansing is that he B. typhosus is actively motile, and therefore would probably be emoved more easily than B. coli. The subject demands further investigation.

Use of Copper and Copper Salts.—I have already recorded in the Journal of the Sanitary Institute, Vol. XXV., 1904, my experiments as o the activity of copper solutions and metallic copper against pathogenic acteria in water, following the observations of the Department of Agriculture in Washington, U.S.A., as to their efficacy in very small quantities gainst objectionable algæ in reservoirs. Copper is present in plants, in hell-fish, and in the liver of animals, and the minority report of the Royal Committee on Preservatives agreed with Continental observers as to the

harmlessness of quantities of copper for adults even up to 1 gramme per day, while Perry and Adams found that 1 in 200,000 was not injurious to fish. Although higher plants and animals are little affected by copper, bacteria, moulds, and minute animal life are very sensitive to it; this is proved by the common application of the salts in agriculture, and is one cause of its customary use for pickles and preserved fruits. I observed that the efficiency of different copper compounds depended on the percentage of copper present in the salt; for instance, more sulphate than chloride was required.[20] 1 in 8,500 of copper sulphate, or 1 in 13,500 of copper chloride, killed B. coli in three hours; 1 in 7,000 of sulphate, or 1 in 10,000 of chloride, killed Staphylococcus pyogenes aureus in two hours.

Hence it appears that these salts might be useful in sterilizing oyster or watercress beds without danger.

Even plates of metallic copper* in ordinary water give off enough of the metal in a so-called colloidal state to make the liquid toxic to many algæ and bacteria, and I am trying the effect on sewage filtrates of passing them through copper gauze to reduce the number of pathogenic organisms, with a view to protecting watercress beds and oyster layings.

A further research on the germicidal power of copper and its salts on pathogenic and non-pathogenic organisms has just been published by Fleet-surgeon Bassett Smith, of the Royal Naval Hospital, Haslar, in the July number of the *Journal of Preventive Medicine.* He experimented with B. typhosus, coli, enteritidis, B. dysenteriæ (Flexner), Micrococcus Melitensis (the organism of Mediterranean fever), and with ordinary water organisms, comparing the effect of copper with that of iron, zinc, lead, and tin. His copper-sulphate solutions were of 1 in 1,000 1 in 10,000, and 1 in 100,000 strength, and he observed that in all the dilutions with distilled water B. typhosus was killed in under one hour; but in tap water the highest dilution required twenty-four hours; 1 in 10,000 required twelve hours. With B. coli in distilled or tap water the highest dilution was insufficient to kill in twenty-four hours; but 1 in 1,000 was fatal under that time: B. enteritidis was very similar. With B. dysenteriæ and M. Melitensis fifteen hours was effective.

A *ferrous-sulphate* solution was also tried in comparison. 1 in 100,000 was ineffective; 1 in 10,000 was fatal to B. typhosus under seven hours, and to B. enteritidis under forty-eight hours; 1 in 1,000 killed B. coli in less than twenty-four hours. He therefore finds ferrous sulphate almost as effective as copper sulphate, but it has the disadvantage of rendering the water yellow and turbid.

* For details I must refer to my paper mentioned above.

[e confirmed the germicidal power of bright copper surfaces. B. ty- ıs in a copper vessel was still living at twelve, but was dead at ty-four. With ordinary tap-water organisms, the number being) per cc. at first, only 8 per cc. were left after twenty-four hours; ıain decrease occurred in the first hour, and the liquefying bacteria ased from 16 to 2 in three hours, and to none in twenty hours. No :r was found in solution.

[e concluded that clean iron was nearly equal to copper in power, and had almost the same effect, but as the metals must be bright (or the n, which is probably electrical, not chemical, will be lost), iron soon its value by rusting, and zinc also becomes oxidized. Strips of ary zinc foil up to forty-eight hours had not sterilized any of the ıisms. Iron coated with zinc, or galvanized iron, would obviously ı the electrical effect.

.n attempt to sterilize urine containing pathogenic organisms, by ng it in a copper vessel, was not successful after twenty-four hours ıct, and it was considered that this was due to the action of the urine e metal.

ead, tin, and a control glass vessel showed practically no effect. The usions of the paper are that in tanks for the storage of water, iron, :r, and zinc as galvanized iron show only a slight difference in bac- dal power, and that "zinc, or iron, coated with zinc, though less rapid tion than copper, yet after twenty-four to forty-eight hours appears e the water from typhoid organisms."

PART III.

WHERE NOT PRACTICABLE, IS THERE AN ALTERNATIVE?

ιt the outset, I must mention that, in the contamination of shell-fish ering grounds and watercress-beds, sewage and sewage effluents are .lways in fault, and that some of the other occasional polluting matters, ʒ more recent, are more dangerous in character. The L.C.C. ercress Report, already quoted, specifies beds polluted by cattle, by e drainage, by trade effluents, adjacent farms and stables, and asional deposit of human excreta near the intake." In my inspection .e Medway fisheries I found that no adequate sanitary provision was : for the men engaged in the industries, and, as I should surmise in r fisheries, local contamination may arise from this cause. Evidence :e the Royal Commission on Sewage as to another locality[21] stated "a large number of barges after unloading refuse pump out the

offensive and highly polluted bilge water into the creek," and the oysters in the neighbourhood are found to be infected although there is no discharge of sewage in the vicinity.

In an analogous case within my own experience, oysters from a laying far from any source of sewage pollution had been condemned independently by Dr. Klein and by myself, and it appeared that some other form of contamination must be present. On an inspection I found in a creek joining the channel a heap of about 5,000 tons of town refuse which had been discharged partly below high water mark, and was draining into the creek, and another screened heap about half the size near by. Other objectionable cargoes were also being unloaded on the banks. In a case that has just occurred where crabs were condemned, and were reported to be "swarming with organisms which would cause serious illness," it was suggested that they had been contaminated by the flooding of a barge while being brought to London.

If the damage on the other hand is clearly traced to the sewage, the remedy lies at law, but it has been by no means satisfactory in experience. The sequel to the Emsworth outbreak of typhoid has been an action[22] by the owner of the beds for an injunction to restrain the District Council from placing or maintaining their sewage outfalls in the neighbourhood of his oyster beds, and from delivering sewage on the said foreshore so as to contaminate the same, and to render the oysters liable to be infected and unsafe for food, with damages to the business.

The judge allowed the claim that these were private oyster beds, and disallowed the defence of prescriptive right to discharge of sewage, chiefly on the ground that the Sea Fisheries Act, 1868, made it criminal to discharge sewage so as to contaminate private oyster beds, and there could be no prescriptive right to commit a criminal act. Further, no one can acquire by prescription a right to pollute a public fishery. He would not, however, grant an injunction on the grounds stated in the similar case of the Earl of Harrington v. Derby, which I have already summarized. Similarly there was judgment for the plaintiff with damages.

The law, therefore, as defined by these two recent cases, is that a corporation may continue the pollution and be fined at intervals to an indefinite amount when injury is proved. This liability is further foreshadowed by a well-known case lately decided in which a large dairy company had to pay heavy damages, upheld by the Court of Appeal, on account of a death assigned to the presence of typhoid germs in milk supplied by them. It seems obvious that the same might apply to a pollution of water, and to a public authority. It is clear that public

ıterest in the prevention of disease, as well as economy and the avoidance f trouble, indicate the sterilization of effluents as a general course.

At the Glasgow Congress of The Royal Sanitary Institute, places of oliday resort were described where large numbers of people gathered and onsumed shell-fish, and enteric fever often resulted. These shell-fish ere not owned by anyone, and the place could not be registered. Therere it was argued that *no sewage should be allowed to be discharged in n unpurified state*, otherwise it would be almost impossible to compel uthorities to exercise supervision over the whole foreshore.

The occurrence above alluded to has been further investigated by Dr. halmers, Medical Officer of Health for Glasgow, and from his recent eport to the Health Committee of the city it seems that the regular rade gatherers of shell-fish are in the habit of rejecting those lying on ıe surface and regarded by them as "sick," and of only collecting those hich have embedded themselves in the sand, and therefore have been a great extent protected from the sewage. On further inspection of athering grounds for the Glasgow market, it was found that the regular ollectors were quite aware of the danger attached to certain contaminated reas, and that mussels were not taken from places near sewer outfalls. isitors, however, were not so careful, with the result that there had been number of cases of typhoid associated with the collection and conımption of shell-fish by excursionists, but that there was little evidence ırowing suspicion on the market supply. Dr. Chalmers finds that the formation is not at present sufficient to define the distance from outfalls ıat would render shell-fish safe to gather: it would be much influenced y tides and currents. He suggests an inquiry into the whole area of ıell-fish layings in the Clyde basin, with a view to marking off such as ome within the danger zone of sewage pollution. The Public Health ommittee of Glasgow have advised their medical officer to communicate ith the clerks of a number of coast authorities, suggesting that they ıould have boards placed on the sea-front, warning visitors of the risks tending the casual consumption of shell-fish found on the shore.

But there are large cities, such as London and Manchester, whose ewage is of such immense volume, that the cost of sterilization may be eyond present possibility. It seems that the difficulty must here be lved as a financial question, namely (in the words of Rudolph Hering, eaking of similar cases in America, notably New York and Baltimore), whether the city is to purify its sewage, or whether the oysters that may e polluted by the same will have to be grown elsewhere,"[23] like other ultivation industries that have to be moved in the extension of cities.

Dr. Buchanan has shown [24] that shell-fish collected one or two miles from a sewer outfall were free from contamination.

The Royal Commission had before them evidence that many established beds could not be moved without great loss, nor suitable sites found elsewhere. The dilemma is practically solved if we consider the following case :—

The Duty of the Vendor.—The decision in a High Court of Justice appeal, Frost *v.* Aylesbury Dairy Co., Feb. 24th, 1905 (the case I have alluded to above), laid it down as common law that on the sale of an article for a specific purpose (in this case for consumption as an article of food), there was a warranty implied by the vendor that it was reasonably fit for the purpose, and there was no exception as to latent undiscoverable defects.

It is only very recently that the communication of disease has been considered as a ground for recovering damages. Even if the giving of a warranty be avoided by putting up a notice, liability for negligence or want of care will still remain. It seems, therefore, that an action for damages could be laid by the customer against the vendor, and that the latter could recover from the polluters of his beds; but this is an expensive and dilatory process. One of the safeguards for vendors is the inspection of supplies. In London the power exists, through the Fishmongers' Company, of prohibiting the importation of polluted fish to the metropolitan markets. I may notice, in passing, that sprats, whitebait, and smelts, as they are eaten uncleaned, and the cooking is often not sufficient to insure sterilization, require bacteriological attention, and that in the examination for coli and enteritidis it is not the presence, but the frequency or number of these organisms that is of most import.

Taken together, the precautions that lie in the hands of the trader, and finally in those of the consumer, are the following :—

1. *Selection and maintenance of clean beds.*—That good shell-fish can be raised under such circumstances is proved by the Report of the Local Government Board for Ireland, 1904, and by evidence before the Royal Commission on Sewage, Vol. II., 1904, showing that many of the best brands come from localities free from dangerous pollution. With regard to watercress, the London County Council Report already referred to, shows that cress of the best quality can be grown under conditions to which, from a public health point of view, no exception can be taken (p. 7), and that the best beds were, generally speaking, found on a bottom of hard clean gravel: such beds are regularly cleansed, and in some cases a light dressing of lime is used at each cleansing in order to destroy organisms deemed to be injurious (p. 6).

2. *Relaying of shell-fish in purer water.*—Although in common use, and recommended by a large number of witnesses before the Royal Commissioners, the purifying value of this practice was defined in the Report as "at present uncertain." Referring to the work of Herdman, Boyce, and Klein, it was said[25] that "judged from these experiments it would seem that polluted oysters placed in approved waters might free themselves from dangerous organisms in the course of a comparatively short period [ten days to a month were mentioned], but as regards cockles and mussels, relaying might be less effective."

3. *Sterilizing objectionable organisms in the beds themselves.*—Better precede by cleansing as far as possible. How chlorine, acids, or copper can then be used I have indicated: the first would probably be the cheapest, and at the seaside electrolysed sea-water would readily be attainable.

It is customary to lay the oysters required for market in pits at high water mark, so that they shall be readily available for transport. In these pits it is easy to add a sterilizing agent and keep for a period of, as it were, quarantine, and to inspect them as to objectionable organisms being killed. This would be cheaper than attempting to sterilize the whole of the estuary or sewage discharging therein, or even to ensure the non-coli environment of the oyster beds themselves. Such sterilization is on the principle I have always advocated—that it should be as near the consumer as possible and should be confined to the thing consumed. Actual details have to be worked out for the particular industry. The similar removal and temporary storage apart of the watercress required for market seems possible. It is conceivable that sterilizing, with chlorine or other agent the beds where shell-fish spat or young watercress is present might have an injurious effect on the young growth, therefore that treating the adult product would be preferable.

4. *Sterilizing by Cooking.*—Where this can be done thoroughly it is effective, and the Commission found that cockles and mussels can be so thoroughly boiled as to bring about the destruction of pathogenic organisms without rendering the mollusc itself uneatable[25]. An incidence of typhoid at Glasgow in 1903 was due to *raw* cockles; those who had eaten *cooked* mussels and clams escaped injury.[26] The heating is very often imperfectly done: thus a number of enteric cases in South London two years ago were due to cockles which were stated to have been boiled for three minutes, but this had not sterilized the interior. I have also quoted earlier an instance at Southend. When, as is frequently the practice, cockles are put into the boiler in a bag, the centre portions may

easily fail to reach the temperature, a little above 60° C., necessary to sterilize B. typhosus, hence it is better to put them in loose or on a grating, and stir at first. The adoption of precautions without injury to the trade is exemplified in Dr. Nash's report to the Borough of Southend for 1904, in which he states that the shell-fish are now drawn from purer sources, and that nearly every seller in the town subjects them to the action of live steam under pressure for four or five minutes, the result being that not a single case of typhoid due to cockles occurred during the year.*

Sterilization by the Consumer, the last line of defence.—I have suggested how this has been done instinctively, with a measure of success, in the usual consumption of vinegar with these foods, and have indicated how it may be more certainly accomplished by washing with weak chlorine or acids. Obviously, the vendor is not thereby absolved from his attention to the quality of his goods, nor the local authority from the duty of obviating pollution where it is dangerous. We must remember that most articles of the kind we are discussing are habitually washed at least twice, by the retailer and by the private purchaser, before consumption, and that sterilization of dangerous organisms at the same time would scarcely add appreciably to the trouble or cost.

The danger that has been so much urged of admitting effluents to drinking water streams, and a great deal of the expense of sterilizing effluents and water supplies, would be minimized if the consumer also sterilized the small quantity of water used for *drinking* (estimated at about a gallon per head per day) in a way that I have for some years advocated.[27]

During the passage to houses through pipes there is a constant risk of contamination from the liability of the pipes, even under pressure, to suck in polluting matter from the soil, so that it has been frequently demonstrated that the supply to houses is often much inferior to the filtered waters in the reservoirs and mains. Here again a final line of defence is necessary. I pointed out that as sterilization, so far as concerns dangerous organisms, is essential for safety, much of the expense might be saved by making the treatment at the works less costly, since it was superfluous to purify water required for a large number of domestic uses, for flushing the streets, or for sanitary purposes. It became a question whether we should aim at the whole public supply being purified up to the maximum

* Local vigilance is, however, maintained, and I notice that at Southend on Nov. 8th, 1904, a fisherman was fined for selling mussels unfit for food. Dr. Klein stated that 80 per cent. of these mussels contained a very large quantity of sewage organisms, and the water from the spots at which they were taken was polluted. *Public Health*, Jan. 1905, p. 266.

standard of a good drinking water, with a great extension of stringency as regards discharging effluents, or whether we should be content with a somewhat less purified water for the general supply, and sterilize separately in each house, under some conditions of municipal control, such portions as should be required for food purposes. Of the three methods that I have described for rendering the fluid germ-free, the chemical one, by ozone or chlorine for instance, could be employed at the works, while the heat-sterilizer, or Pasteur filter, could be put into the consumer's house by the municipality or by a water company, preferably by the former, as an integral part of the ordinary water fittings, and the duty of keeping it cleansed and in order secured by official inspection.

STORM WATER.

A great difficulty in guarding effluents arises from the great volume at intervals of storm water.

In bacterial treatment, whether by tanks, filters, or land, it is known that the resolving organisms are most active, especially in the final or oxidizing stage, when the liquid is of moderate strength, since undue concentration retards the growths, while too rapid a flow is liable to wash them away. Chemical processes of precipitation or sterilization on the other hand find concentration an advantage, so much so that some of them, as for instance the Liernur process, require the aid of evaporation. It is clear, therefore, that in both cases heavy dilution is to be avoided, if possible, for other reasons than that it increases the size of the works. This has led to the adoption of various schemes under the separate system, for the exclusion of road sweepings and washings, drainage of land, rain and storm water; and at Basingstoke, a plan has lately been adopted to make the sewers watertight, and at the same time to dispose of subsoil water. The latter, of course, is usually innocent, but I have always maintained that the other liquids excluded from treatment are by no means invariably safe. The fluid from frequented roads, for example, is often exceedingly foul, and in a recent instance in London I found it to contain large numbers of organisms of dangerous types. These proved in my experiments to be destroyed with comparative ease by a sprinkling of a suitable disinfectant (permanganate was not satisfactory), and the same thing was noticed in Glasgow at the time of the plague scare in 1901, where a hypochlorite solution was used.

That storm water passing rapidly off the land carries with it disease germs is shown by the frequent occurrence of epidemics when a sudden heavy rainfall succeeds a period of drought. I have repeatedly observed

storm water to be even more impure than the ordinary sewage; a sample I collected in January of this year contained in parts per 100,000, free ammonia 1·61, albuminoid ·40, oxygen consumed 6·01, chlorine 5·4, nitrogen as nitrates and nitrates ·197; whereas the sewage gave generally better results, and the land effluent from the same works yielded an average of ·6 free ammonia, ·12 albuminoid, 0·53 oxygen consumed, and ·57 of oxidized nitrogen.

On this subject the investigations for the Royal Commission on Sewage led to the conclusion in the report of 1904,[28] that storm water was almost invariably impure, both chemically and biologically, that street washings were all impure biologically, even when they contained only a small quantity of organic matter, and that the liquid might even be very impure after long continued rain. It is remarked that "the practical advantages of the separate system may be great, and doubtless storm overflows are necessary, but the fact that storm liquids may be so impure, both chemically and bacteriologically, is a point of considerable importance."

The well-known regulations of the Local Government Board are that (1) provision must be made for treating fully as ordinary sewage a volume of mixed sewage and storm water equal to three times the daily dry weather flow, and that (2) an excess above this must be treated on a special storm filter, or on an extra area of land. As I remarked at the Manchester Congress of The Royal Sanitary Institute,[29] purification to a bacterial standard of the 120 million gallons daily of Manchester sewage would involve works similar to waterworks as an adjunct to the sewage works, but six times the size of the waterworks already existing. At this Congress Major Firth advocated the sterilization of effluents wherever possible, or at least the freeing them from pathogenic germs.

In general, as I have elsewhere indicated, these liquids which are excluded from the main sewage by the separate system are well supplied with liquefying and oxidizing bacteria, which, if storage and subsidence reservoirs could be provided, would effect the purification rapidly, aided by the deposition of the earthy substances.

Conclusions.

The conclusions, therefore, are:—

1. Subsoil and deep drainage water can as a rule be separately pumped and discharged. The relief that may result to a system of sewage treatment has been shown in a recent instance at Rathmines, Dublin, where

the normal sewage of $2\frac{1}{2}$ million gallons per day is swelled to 6 millions by subsoil drainage. A similar observation has been made in other towns.

2. Road washings are dangerous, and especially under the separate system should be sterilized *in situ* by sprinkling the surface with effective disinfectants.

3. Storm water should be impounded and stored or otherwise treated, and must never be allowed to pass in large volumes directly into a stream. If it be treated with a disinfectant such as the oxides of chlorine, the larger the volume of liquid the more dilute it will generally be, and proportionally so much less of the reagent will be required.

I have not space to do more than allude to trade effluents. They would sometimes increase the cost of sterilization; occasionally on the other hand they would help to sterilize. Their treatment should be a matter of agreement with the manufacturers.

All sewage disposal practice makes it apparent that want of success in the schemes has been almost invariably due either to nuisance created by odours or by the failure to remove suspended solids. The fault can sometimes be traced to bad working, or to mistakes in principle, but less often now than formerly, on account of the scientific work that has been done, and the increased experience and intelligence of the managers of sewage works. Most prominent among the causes of failure has been that the tanks have commonly been of insufficient size for purification by the methods adopted. But the constructions had already grown exceedingly extensive and costly, and the Local Government Board, instead of encouraging improved methods, have for years seriously hampered local authorities, and in many cases actually prevented needed works from being carried out, by insisting on full treatment for a three-days' dry-weather flow, and partial treatment as a provision for storms up to six times the normal flow, together with in the majority of cases until recently an insistence on the purchase of land.

Instances where the trouble has arisen from the pollution of shell-fish or from local epidemics through the discharge of sewage, have been less numerous, but have gradually spread the conviction that effluents should be sterilized, at least partially, to render them incapable of actively transmitting disease.

With the knowledge now before us I do not think the difficulties are at all so formidable as they have been supposed, and I have indicated in this paper how a freedom from suspended matter and odour, and the required sterilization, can be attained by utilizing existing works. I believe that a tank to remove solids, *plus* a disinfecting process which will

arrest decomposition, destroy smell, and diminish pathogenic organisms to a safe point, ascertained by a duly constituted Rivers Board having a knowledge of the local conditions of the watershed, would fulfil all requirements of modern sanitation in the majority of our large rivers and estuaries. We should thus get rid of the present stereotyped and effete regulations. We should also largely dispense with land and diminish the volume of filters, and we have seen that the unsatisfactory working at times of both the former, *qua* bacterial danger, has been conclusively proved.

BIBLIOGRAPHY.

1. Trans. Amer. Soc. C.E., Vol. LIV., Part E, 1905.
2. Vol. IV., Part I., 1904, p. 105.
3. Rideal, Cantor Lectures, Soc. of Arts, 1902, p. 27 ; also Journ. Soc. of Arts Dec. 17th, 1897, p. 86.
4. Third Report, 1903, p. 26.
5. Journ. R. San. Inst., Vol. XVII., Part IV., Jan., 1897.
6. Ibid., Vol. XXV., Part III., Oct., 1904.
7. Ibid., Vol. XXIII., Part IV., Jan., 1903.
8. Report of Medical Officer to Local Government Board, 1900–1901, p. 567.
9. *Public Health*, Aug., 1902.
10. Trans. Amer. Soc. C.E., Vol. LIV., Part E, 1905, pp. 148, 149.
11. Journ. R. San. Inst., Oct. 1904, p. 454.
12. R. Comm. on Sewage, 1904, Vol. II., p. 100.
13. Ibid., Interim Report, Vol. II., p. 538.
14. Ibid., Vol. II. p. 519.
15. Ann. Inst. Pasteur, 1895, Vol. IX., p. 673.
16. Parkes & Rideal, Epidemiological Society, 1901 : *Lancet*, Jan. 26th, 1901.
17. Galli Valerio, Bull. Soc. Vaudoise des Sciences naturelles, 1902, No. 143.
18. Parkes & Rideal, *loc. cit.*
19. Archives de Médecine Expérimentale, July, 1901.
20. *See also* Green, *Zeits. für Hygiene*, 1893, p. 495.
21. Fourth Report, Vol. II., p. 83.
22. Foster *v.* the Warblington Urban District Council, Dec. to Jan., 1905.
23. Trans. Amer. Soc. C.E., *loc. cit.*
24. Journ. R. San. Inst., Vol. XXV., Part III., 1904, p. 466.
25. R. Comm. on Sewage, Fourth Report, Vol. I., p. 40.
26. Journ. R. San. Inst., Vol. XXV., Part III., 1904, p. 467.
27. Cantor Lectures, Journ. Soc. of Arts, Aug. 1st, 1902, p. 749 ; also Journ. R. San. Inst., Vol. XXII., Part IV., p. 565.
28. Ibid., Vol. IV., Part I., p. 105.
29. Journ. R. San. Inst., Vol. XXIII., Part IV., 1903, p. 617.

The following notes commenting on Dr. Rideal's paper have been received.

DR. LOUIS PARKES (London): Dr. Rideal has presented a very useful and luable treatise on this subject, which contains a great deal with which oughtful sanitarians will agree. His work at Guildford shows that it is ssible to so nearly sterilise sewage effluents that they may be regarded as actically harmless, and that this can be done with chlorine solutions at very eat dilutions, so that the expense of the process is not prohibitive. The ficulty is with the practical application of the sterilising process as a matter routine treatment. Could the process, as experimentally adopted at Guild-rd, be relied upon always to remove or destroy pathogenic organisms in a wage effluent which was being discharged into waters in the near neighbour-od of oyster layings or watercress-beds? Unless the sewage effluent so scharged could be guaranteed to be at all times harmless, the sterilising ocess would not be an effectual safeguard against the risks to health to hich the consumer of oysters or watercress is liable. It seems doubtful if ie process advocated, or any other sterilising process, could be worked with ich automatic regularity, that despite constantly occurring changes in volume, chemical quality, and in bacterial contents of the effluent, the result after eatment should always be the practical disappearance of pathogenic organisms id their congeners—the bacilli of intestinal origin. Relative freedom from ich organisms, and freedom which is not invariable, would be an insufficient otection under the circumstances suggested. What the consumer of oysters, issels, whelks, or watercress wants to know, is that there is no possibility such articles having been polluted with sewage—not that there must of cessity be pollution unless a highly complex system of sterilisation is applied, ich is liable to break down and failure as a result of human error or want of esight.

PROF. H. R. KENWOOD (University College, London): I agree with Dr. Rideal it the suggestion that local authorities should *in general* be further hampered increasing their existing burdens in treating sewage, so as to produce efflu-ts equal to drinking water, is obviously absurd and unjust; but when people compelled or allowed to drink water which has previously received sewage luents, what is the alternative? I do not believe it is to be found in domestic rification of the polluted water. The drinking water supplied by local thorities or public water companies should always be obtained from sources hich are above the suspicion of dangerous pollution, and only where this is bsolutely impracticable should the water authority (and *not the individual in the ome*) undertake the purification. I am opposed to all methods aiming at the omestic purification of a public water supply, for I know of no method that I ould trust one household in ten to carry out with the care and system which

are necessary if it is not to prove a delusion and a snare in practice. Recognising the difficulty of *insuring* the safety of those who are asked to drink previously contaminated water, I conceive it to be a duty to discourage makeshift methods (which are unreliable) and to advocate that which is the only safe course, viz., the adoption of a drinking-water supply from a pure source and kept pure. This ideal of decency and safety will often prove difficult and costly of realization, but public money is often spent to less advantage; and were I a member of the spending authority I should not fear to meet the ratepayers with reference to such expenditure. On these principles I contend that the sterilisation of sewage effluents ought not to be necessary. Nor is it absolutely necessary that shell-fish and vegetables should be exposed to sewage contamination. If, however, it can be maintained that there is no escape from drinking water which is under the ban of previous sewage contamination, then the question arises as to whether it is *practicable* to sterilise sewage effluents. Dr. Rideal has dealt with this aspect of the matter in his usual thorough and well-informed manner, but despite what he has to tell us it is difficult for me to believe that any method which depends for its sterilising power upon oxygen is likely to be the method which would eventually be selected as the cheapest and most efficient. What is wanted is a process which is capable of exerting a selective influence (primarily, if not entirely) upon the organic life in the effluent, and not one which first expends the major part of its powers upon the harmless and non-specific matter. His suggestion of a chlorine treatment of the sewage or effluent prior to its discharge into the sea or an estuary seems to me to be a good one. One is not surprised to find that Dr. Rideal's experiments demonstrated that *absolute* sterility of a sewage effluent was not practicable for the reasons which he gives; and I am disposed to agree with him that it is not necessary from the point of view of safety, even when the effluent is admitted to drinking water; but I should not care to take the responsibility of advising as to precisely what degree of sterilisation would always prove absolutely safe in practice. It is true that in the examination for coli and enteritidis it is not the presence, but the number, of these organisms that is of most import; but it is equally true that so long as there are coli organisms in the effluent, there may be also the bacillus of enteric fever, for the vitality of the latter germ may be taken as about equal to that of its near relatives of the coli group. In conclusion, I would observe that the suggestion contained in the last paragraph of this interesting paper, would, if adopted, deal a heavy blow to the hitherto much-advocated biological purification of sewage. Although I have always recognised their limitations when dealing with town sewages, I still believe that the purely biological processes are the best and most rational; for sewage should be discharged into rivers after the only means of ultimate purification—the natural agencies—have carried it to an advanced and inoffensive stage. The suggestion would seriously handicap and delay these *only means* of ultimate resolution.

DR. GILBERT FOWLER (Manchester): Dr. Rideal's paper is a valuable contribution to an important subject. I agree with him in thinking that chlorine, especially in the form of hypochlorites or chlorine oxides, is one of the most practicable disinfecting agents for sewage or effluents. From what I know of the continental work on ozone, especially at Lille and at Weesp, near Amsterdam, I believe that there is a future for it as an occasional "finisher" for waterworks filters; but the amount of oxidisable matter still present, even in a good sewage effluent, would render the application of ozone to sewage, in other than very exceptional cases, prohibitively costly. Dr. Rideal's rule that the amount of chlorine necessary was 1·7 times the five minutes' oxygen test, would only apply to domestic sewage. Where oxidisable trade waste was present the conditions would no doubt be altered, in some cases less even might be required than the proportion mentioned. In some experiments at Davyhulme they found that one part of chlorine was sufficient to prevent 300,000 parts of settled sewage from becoming putrefactive. It is important to note, however, that chlorine was taken up almost instantaneously by solutions containing free sulphide; for that reason there appeared little use in adding chlorine to the effluent from the chemical treatment of Manchester sewage, when that had to enter the Ship Canal, the water of which was black from suspended iron sulphide. For the same reason it is questionable whether it would be economical to add chlorine to the effluent from septic tanks, unless the septic action was not allowed to go far enough to produce sulphides. In cases where purification by filters is required in addition to sterilisation, *e.g.*, in the case of isolated hospitals, it became necessary to add the sterilising agent before the liquid passed on to the filters, or these latter might become a source of infection for an indefinite time. The work of Dunbar and Korn (Gesundheits Ingenieur, 1904, No. 2) indicated that the addition of hypochlorite was not prejudicial to the action of percolating filters, as the hypochlorite was rapidly oxidised to chlorate. Some doubt had been expressed as to these results, and further work appeared to be necessary to determine the amount of hypochlorite that was necessary for adequate disinfection on the one hand, and which would not, at the same time, quickly inhibit the action of the filter. Dr. Rideal was right in drawing attention to the difficulties connected with the treatment of storm-water. I am convinced that until these are successfully met, the problem of sewage purification is by no means solved. Unfortunately their experience in Manchester indicated that, owing to the scouring action of the first flush of the storm, there was no necessary relation between volume and composition. I believe the solution lies in the direction of impounding as much as possible of the storm-water in tanks, when, if necessary, some method of sterilisation of the tank effluent might be resorted to. In no case, however, would it appear to be necessary to reduce the number of organisms below what could be readily removed by an efficient system of waterworks filters.

Dr. W. G. Savage (Colchester): I can only hope to deal with a few of the points raised by Dr. Rideal in his valuable paper. As he points out, the degree of purity required of an effluent must largely depend upon its ultimate fate. I cannot but think it a most unnecessary requirement to demand even the partial sterilization of *all* effluents, quite irrespective of the nature of the water into which they are to be discharged. Effluents must be reasonably purified according to well-recognised standards, but that all effluents discharged into rivers should be practically germ-free seems to me to be neither a necessary nor justifiable requirement. Turning to particular instances, the most important practical question is in relation to tidal waters and shell-fish, and I will confine my remarks to this aspect. I have not had sufficient practical experience of any of them to discuss with advantage the methods of sterilization suggested, and the oxychloride process is unknown to me. I should like to have more particulars as to the actual cost of these sterilization processes, for the question of cost is an all-important one. The author apparently is in favour of the sterilization of effluents as a general course, but even for tidal waters I cannot agree that this is necessary *as a general course*. It is a sound public health principle to obtain a pure article (*e.g.*, water or milk), rather than to be content with purifying a contaminated one, and we should aim at oysters from pure laying grounds rather than be content with beds contaminated with sterilized effluent. By careful bacteriological and topographical examinations it is possible to ascertain if oyster layings are liable to such an amount of sewage contamination as to render it likely that shell-fish from such layings will produce disease. I have recently demonstrated the value of tidal mud examinations for this purpose. The proper course, I believe, is then to prohibit undoubtedly contaminated layings. In certain cases it may be advisable to partially sterilise the effluent, not as a general measure applicable to all effluents, but only as an exceptional course. The recommendation of the Royal Commission, that specially created Boards should register all oyster beds, pits, etc., and that all shell-fish areas should be defined, seems to be a sound and practicable one. Apart from the principle being a bad one, there are several practical objections to sterilization of effluents, and these apart from the primary one of cost. Thus, as Dr. Rideal himself points out, these chemical methods require systematic analytical control for maximum efficiency, in itself expensive and not always regularly attainable. Then I am by no means sure that with such a variable and complex fluid as sewage there would not be a considerable likelihood to occasional breakdowns, with corresponding danger, if sterilization alone was relied on, and such a fluid was poured over oyster beds. Again, I believe that not a little of the actual dangerous pollution of beds is from isolated drains, etc., from individual houses, or small groups of houses, and these would remain unaffected; so that, even with sterilization, we should have no certainty of efficiency. In certain doubtful cases, for which closure of the beds would be a great hardship, proper storage in pure water before sale would probably obviate the difficulty.

DR. J. T. C. NASH (Southend): I venture to think that Dr. Rideal's article (embodying, as it does, the conclusions he has arrived at as a result of a large number of carefully conducted scientific experiments) is a very valuable addition to our knowledge, and to our means of dealing with sewage problems. Present methods of dealing with sewage require so much land or filters of so large a volume, and withal are so liable to prove unsatisfactory in the working, that in certain districts the cost would not only be prohibitive because of the high value of land, but the relative improvement of the sewage effluent—especially as regards pathogenic bacteria—is so comparatively inadequate, as to be almost worthless. If the main object is only to produce a comparatively clear effluent which will pass an arbitrary chemical standard, some of the processes at present in vogue may claim with some reason to accomplish this aim. But if a primary object is to remove one of the most real dangers of sewage—that is, the pathogenic bacteria so frequently found therein—then "Tekel" must be written up against them almost without exception. If, as I believe, simplicity is one of the criterions of usefulness and success in any method of sewage purification, Dr. Rideal's method is eminently simple, and resolves itself into (1) a tank to remove solids; (2) a disinfecting process applied to the resulting primary effluent. I have always felt that it would be incautious to deduce from the experiments by Dr. Sims Woodhead and Dr. Pickard that the typhoid bacillus is rapidly killed in the septic tank. I know from analogy, from my own observations, and from the recorded experiences of others, that bacteria (and more particularly, perhaps, the bacteria associated with disease processes) are very susceptible to evolutionary factors, and will exhibit, under altered environment, some slight changes in their biological characters. I believe that the bacillus typhosus is derived (through the working of some unknown factors of environment) from the common colon bacillus, and I believe that, unless specially preserved under favourable conditions, the B. typhosus tends to revert to the coliform organism. Be this as it may, the bacillus coli communis is in itself a pathogenic organism; it is a hardy organism; and it is not so closely hedged in by biological requirements in its identification as the B. typhosus. Scores of varieties of the B. coli are admitted by all bacteriologists. Hence this organism is undoubtedly the best index of the purity of any water or sewage effluent, and I am glad to see that Dr. Rideal has adopted it as his index of pollution in his valuable experiments. Generally I agree with him that the greater the aëration and nitrification of an effluent, the less probability of survival of pathogenic organisms. In connection with the chlorine method, he tells us "that the purification is mainly effected by oxygen liberated in an active state through the action of chlorine on water." The chlorine is more efficacious when in the form of hypochlorite, and still more so in the form of oxychloride. It is my opinion that available chlorine in the form of hypochlorite or oxychloride is probably often present naturally in sea-water. Whether this be so or not, I agree that for those seaside towns which are in the unhappy position of (1) not

having their sewage held up for some hours in tanks; (2) not having their outfalls sufficiently far removed from the shore; and (3) not having strong enough currents to carry their sewage well away to sea when discharged on the ebbing tide, the chlorine method of treatment may prove advantageous. Until, however, the first deficiency (viz., that of storage accommodation to enable the sewage to be held up for some hours, thus giving time for disintegrating bacterial action) has been met, any disinfecting method will be largely nullified. Where the sewage is held up for some hours prior to discharge into the sea at a point below low-water mark decided upon after carefully conducted float experiments, and provided that the discharge of sewage takes place only during the earlier hours of the ebb, my experience and opinion is that no better method of disposing of sewage exists at the present time than discharge into the sea for the following reasons:—(1) The volume of sewage is so inconsiderable when compared with the immense quantity of diluting sea-water, that outside a radius of half-a-mile from the outfall there would be found practically no difference in the ammonia, oxygen consumed, and nitrate figures, as compared with ordinary sea-water. (2) Bacterioscopic examination of sea-water within half-a-mile of such outfall would as often as not show a bacterial content of only from 20 to 200 aerobic bacteria per one cc. (this is an eminently satisfactory bacterial content for sea-water so near the shore). (3) The immense amount of oxygen in sea-water, and the incalculable amount of macroscopic and microscopic life in the sea, speedily effect complete reduction of all organic pollution. (4) It is extremely unlikely that any pathogenic bacteria survive outside a radius of half-a-mile from a sewer outfall in a wide estuary, or in the open sea. It is, however, a matter of lively satisfaction to know that pathogenic bacteria can be definitely destroyed by so simple a method as the oxychloride method. One can hardly imagine a more satisfactory result than a sewage effluent (as the result of such simple methods of treatment) containing on an average less than one B. coli per cc. I should just like to add that my investigations enable me to confirm Dr. Rideal's observation that in the contamination of shell-fish, sewage from a sewer outfall is not always in fault, but that other occasional pollution of a more recent and therefore more dangerous character is not infrequently to blame; and further, that not only is there no adequate sanitary provision made for men engaged in the shell-fish industries, but that large fleets of sailing boats often lie at anchor directly over oyster beds, and it is well known among fishing folk that a fisherman almost prefers to obey the calls of nature after he has boarded his boat.

Dr. G. Reid (Staffordshire C.C.): Concerning the means by which sewage effluents may be sterilized I have nothing to say, and while there is much to be said by way of criticism regarding some of Dr. Rideal's proposals from a river pollution point of view, in the limited space allowed me, I propose to confine my remarks to such of his proposals as would, if put in practice, impose new responsibilities on sanitary authorities, and still further complicate the question of

sewage disposal, the solution of which, in many instances, is already difficult enough. Hitherto it has been deemed sufficient to effect such changes in the constituents as shall, to put the matter shortly, remove the suspended solids and render the fluid part non-putrescent; and while recognising that the methods adopted did not entirely deprive the sewage of qualities which, under certain circumstances, might prove dangerous to health, the remedy in that respect has not been thought to concern sewage disposal authorities. From this point of view the paper deals with the risks attending sewage disposal as regards the possible contamination of pathogenic organisms of (*a*) drinking water; (*b*) oysters and other shell-fish; (*c*) water-cress and other vegetables. With his views in this respect regarding water supplies I entirely concur. It is clearly the duty of the water authority to ensure that the water they supply is wholesome; and even if it were practicable for the sewage disposal authority to free the sewage from disease organisms, and such a duty was imposed upon them, the water authority would not thereby be relieved of this responsibility. This being the author's opinion so far as water supplies are concerned, it is difficult to understand why he should suggest that the sewage disposal authority should be held responsible in the case of shell-fish, water-cress, etc. In such cases, so far as sanitary authorities are concerned, he appears to advocate one of two courses according to circumstances. In the case of sewage outfalls in the neighbhourood of shell-fish gathering grounds or water-cress beds, he suggests that treatment, from a chemical point of view, might stop short of the standard now aimed at, the chief object being to effect sterilization; in other cases, however, chemical purity, as now required, as well as sterilization seems to be recommended. At the same time, Dr. Rideal is careful to point out that both the oyster merchant and the water-cress grower should adopt certain additional precautions, and, as a third line of defence, the consumer also. It is evident, therefore, that occasional failure in the application of the sterilizing process is anticipated, and unless the provision made is gigantic, it is difficult to see how this could be otherwise, considering the excessive flow of sewage during storm periods and the enormous tank capacity which would be requisite at such times to ensure that the sterilizing agent was in contact sufficiently long to effect its purpose before the final discharge. As regards surface water, the author suggests that the antiseptic agent might be applied "*in situ* by sprinkling the surface." How this is to be accomplished is not stated, but it is obvious that no system of water-carts would solve the difficulty; and even if the antiseptic was carried in pipes to numerous spray distributors throughout the district it would, I think, tax the inventive powers of our engineers to devise a method by which the latter would automatically come into operation with each shower of rain and deliver the proper proportion of fluid in relation to the fall. Of course, everyone recognises that the public must, as far as possible, be protected against the risks referred to; at the same time, in determining what the remedy shall be, one must be careful to guard against the adoption of any half measure which would establish a feeling

of false security. In my opinion there is only one practicable remedy, and that is the closure of all shell-fish layings within dangerous distances of sewage outfalls, and of all water-cress beds fed by streams which are not proved to be safe. To allow of this, fresh legislation would, of course, be necessary, and compensation would probably have to be provided for (a mere bagatelle compared with the expenditure the proposals would involve), but that would be a far more equitable arrangement than the penalising of certain districts because of the accident of their position, even allowing that it was reasonably practicable for the authorities of such districts to overcome the difficulty. The author himself admits that his proposals would be impracticable in the case of large towns, and, that being so, it is all the more reason why smaller towns should not have exceptional burdens imposed upon them simply because certain individuals select to establish certain trades in such places, while other localities are open to them where the business might be conducted without hardship or injury to anyone. By all means let the sewage of every district (including those draining into tidal streams or the open sea) be purified, but let the standard in all cases be based upon what has hitherto been deemed satisfactory in the case of non-tidal streams. I notice that Dr. Rideal is silent regarding the capital cost and annual expenditure the sterilization methods he recommends would involve.

MR. W. D. SCOTT-MONCRIEFF (London): The chemical and bacterial aspects of the sewage problem have led to an endless confusion of ideas and arguments; yet there can be no inherent contradiction in natural processes that are the high road to purification. Sterilisation, at the best, is an interference with the natural sequence from organic to inorganic forms, and the limits of its application should be obvious. An effluent chemically good may be bacterially bad, and one bacterially good may be chemically bad. Bacterial processes of purification may produce the first condition, and sterilisation of organic pollution must produce the second. Danger to health may arise from organic matter in a stream whether the polluting inflow is sterilised or not. Whenever and wherever putrefaction sets in, it is not possible to trace or to remove the remoter causes that give rise to pathogenic conditions, and these may become as prolific of danger after as before sterilisation. Sterilisation only means that Nature is forced to begin *de novo*. Dr. Rideal puts this in other words when he says "Absolute sterilisation is not required, and, if attained, would not be maintained." The bacterial purification of sewage divides itself into three stages: first, the hydrolysis or unlocking of the organic nitrogen*; secondly, its nitrification; and the subject matter of the paper deals with what may be regarded as the third stage, the hygienic qualities of an effluent. The first stage is undeveloped in practice, the second is little understood, and the third has been

* *Ungeschlossend* was the word used by Büchner when I discussed the subject with him at Munich in 1893.

employed to cloud the whole of the issues involved. The high-water mark of unreasonableness in this respect was reached in the Report of the Sewage Committee of the London County Council in 1899–90, when they announced that further efforts in the direction of bacterial purification should be abandoned because the effluents from the experimental beds at Barking "could not be reasonably assumed to be more safe in their possible relation to disease than diluted raw sewage." This decision is a matchless *non sequitur*; but it is something for the London County Council and its scientific advisers to have achieved even one great success in any direction. The question of when and how sterilisation should be introduced should be decided on the merits of each individual case, and it ought to be a universal rule that the less organic matter to be sterilised the better. The destruction of pathogenic forms should always be the only object to be aimed at. In the case of living organisms that are capable of indefinite multiplication under favourable conditions, it seems strange that bacteriologists should be content with results obtained per cubic centimetre of water or effluent. Surely it would be better to take the average quantity that a thirsty person would be likely to drink, say a pint. It would be of quite academic interest for anyone dying from cholera or enteric fever to know that the organisms producing the disease had not been discovered in a particular cc., while those in the pint were killing him. The best guarantee is that the water we drink should have been to the clouds and back again, without contamination, before we drink it again. It is doubtful if any form of sterilization, on the large scale, can be regarded as an absolute guarantee of immunity. At the same time, if it must be used, there is no one better able to judge the merits of any particular sterilising medium than the author of the paper.

DR. RIDEAL has written in reply to the comments:—It is very gratifying to see that the comments on my paper have been so generally in agreement with me that they have usually reiterated, sometimes as quite a new thing, the principles in the treatment of sewage that I have long advocated, and have here laid down with, I believed, sufficient clearness. I am glad to find that Dr. Fowler, who has had such large experience at Manchester, is almost word for word with me in his decision that the solution of the storm-water difficulty lies in the direction of impounding as much as possible of the storm-water in tanks, and applying when necessary some method of sterilization of the effluent. I have noticed in my paper the fact he mentions that trade waste sometimes increases, and sometimes may diminish, the volume of sterilization required, but this factor can be ascertained with as much facility as the amount required for ordinary sewage and effluents. Dr. Nash has found, judging from the favourable circumstances he has experienced at Southend, that the discharge of sewage into the sea is safe when the following three provisos are combined: (1) that there is sufficient storage accommodation to enable the sewage to be held up for some hours, giving time for disintegrating bacterial action and the deposition of solids; (2) that the outflow takes place only during the earlier hours of the ebb; (3) that

the final discharge is at a point beyond low-water mark decided upon after careful float experiments. I agree with him under the local conditions, but one must not generalize from this instance. It is a little strange that Dr. Savage, of Colchester, seems to think it easy for an industry which, according to the Royal Commission, engages six to eight millions of capital and an immense number of hands, and is distributed over such a very wide area, only to take shell-fish from perfectly clean water. I have shown how the water, and the shell-fish, can be made clean. In a similar Utopian view, Dr. Kenwood holds that water should only be obtained from "sources which are above the suspicion of dangerous pollution," and that the only safe course is the adoption of a supply of "pure water kept pure." Mr. Scott Moncrieff demands a guarantee "that the water we drink should have been to the clouds and back again, without contamination, before we drink it again." These requirements of an "absolute guarantee of immunity," and suggestions that a breakdown may possibly occur, would impeach nearly every human undertaking. With Dr. Kenwood's observation as to the duty of discouraging "makeshift methods" of sterilizing I cordially agree, but I have attempted to explain methods which could be relied on, and have shown their limitations and the precautions which were necessary. Certainly the bacterial filter as a final domestic defence is not a "makeshift," and I consider that households could easily learn the application of these filters or of efficient heat-sterilizers, and be trusted to use them, with the provision, as I have said, of a, preferably municipal, control and inspection. With reference to the questions of Dr. Parkes and Dr. Reid as to whether the routine use of a disinfection such as I have described in my Guildford experiments would invariably secure safety in the effluents, in view of the fluctuations in volume and character of the sewage, whether they might not have occasional breakdowns, and whether they would not involve expensive scientific management, I would point out that the ordinary ratio of 1·7 between the available chlorine and the five minutes' oxygen consumed, which in daily trials at Guildford was found to give safety in the effluent under most varying conditions, would require only simple daily testing such as is done at present by works-managers. With the methods employed hitherto for treating sewage, either by farms, precipitation, or bacterial processes, the men in charge are required to have, as the case may be, a rough knowledge of farming, chemicals, or filters; and surely it may be presumed that the works-manager would soon acquire sufficient practical knowledge for the simple daily checking of the strengths of sewage and disinfectant.

NOTES FROM THE REPORTS OF THE MEDICAL OFFICERS OF HEALTH.

MANURE IN MILK.

Extract from the Report of the Medical Officer of Health for Bournemouth, 1904.

By PHILIP W. G. NUNN.

During the year I have made 100 investigations concerning the various milk supplies of the Borough. Fifty of these were in respect of bovine tuberculosis, and a similar number with special reference to cleanliness, excess of bacteria, and other undesirable constituents.

The results of examinations for tuberculosis have again been highly satisfactory. No tubercle bacilli were found in any of the samples received. It must be acknowledged that this freedom from tuberculous milk in Bournemouth is most gratifying to all concerned.

I regret being unable to report as favourably with regard to the other series of milk investigations.

A considerable number of samples contained an excess of foreign matter, otherwise "dirt." The predominating evil has been the presence of cow-manure in many milks, and until that form of pollution is more successfully eliminated, clean and wholesome milk will be the exception rather than the rule.

The average condition of Bournemouth milk compares very favourably with that of other places, but that is not enough. Throughout the country there is no article of food so frequently or so grossly contaminated.

It is a matter of common knowledge that milk is one of the most favourable media for the rapid growth and multiplication of bacteria. It should also be known that the smallest particle of manure contains myriads of bacteria; therefore a milk containing manure is bound to be rich in bacteria, and in a condition most favourable for putrefactive changes.

Apart from sentimental reasons, what are the main objections to the presence of manure and excess of bacteria in milk? (1) Its keeping properties are reduced to nil except by artificial means; (2) its nutritive properties are diminished and altered; (3) it not infrequently acquires pathological properties (especially in summer time), and these give rise to numerous disorders, varying in intensity from a temporary "upset" to vomiting, diarrhœa, and other symptoms comparable to mild ptomaine poisoning. The explanation of these facts is not difficult. When bacteria grow and flourish in milk, they take certain elements from that fluid for their nutrition. They also contribute something, *i.e*, their waste

products; the latter are frequently "irritants," and possess toxic or poisonous properties.

Times out of number, in my private capacity, I have been requested to investigate the reason of certain milks disagreeing with people, or causing more serious symptoms, and in the majority of cases the cause has been clearly traced home to the pernicious action of bacteria in altering the composition of the milk. The object of these details is to emphasise the fact that milk, which is submitted to the action of bacteria, undergoes marked detrimental changes; and as cow manure is the most fertile source of bacterial invasion in milk, it is highly desirable, for dietetic and hygienic reasons alone, to reduce this form of pollution to the lowest degree possible.

The whole question of cleanliness concerning the milk supply is admittedly of grave importance from a public health point of view, but up to the present time the ideal standard has not been reached, and it appears questionable whether the desired degree of cleanliness will ever be attained without the assistance of more drastic legislative measures.

SALE AND USE OF UNWASHED FLOCKS.

At the Congress of the Institute held at Glasgow, a discussion was raised on "What the people sleep upon," and arising out of the discussion the following resolution was passed:—

> Resolved that this Conference of sanitary inspectors is satisfied that the manufacture and sale of common unwashed wool-flocks for bedding, furniture and cushion stuffing, should, in the interests of public health, be disallowed by statute, and they request the Council of the Sanitary Institute to take the whole question of the use of this unwholesome and filthy material into their most serious consideration with a view to an early representation being made to Government on the subject, in the hope that as early as possible the matter may be taken up and adequately dealt with.

The Institute have since been in communication with the Local Government Board on the subject, and it will probably be of interest to the members to see the following correspondence which has taken place:—

THE ROYAL SANITARY INSTITUTE,
72, MARGARET STREET, LONDON, W.
November 26th, 1904.

TO THE SECRETARY,
LOCAL GOVERNMENT BOARD.

SIR,

I am desired by the Council to forward a copy of the undermentioned resolution which was passed at the recent Congress of the Institute held in Glasgow, under the presidency of the Right Hon. Lord Blythswood.

The Council desire me to state, that in their opinion the question of unclean

bedding is a most important one, in that it constitutes a serious menace to the public health. They would urge upon your Board that steps be taken to deal with this question, and that it be considered in connection with the Amendment of the Public Health Acts.

(Signed) E. WHITE WALLIS,
Secretary.

(*Resolution given on page* 418.)

LOCAL GOVERNMENT BOARD,
WHITEHALL, S.W.
8th December, 1904.

SIR,

I am directed by the Local Government Board to advert to your letter of the 26th ult. (No. 226), with reference to the sale and use of dirty flock for bedding, etc.; and in forwarding, for the information of the Council of The Royal Sanitary Institute, the enclosed copy of a report by Dr. Parsons on the manufacture of rag flock, I am to enquire what steps the Council consider might be taken, having regard to the difficulties mentioned in that report.

I am at the same time to state, that in the Board's Cholera Regulations of the 14th December, 1892, the Board provided that all rags imported from certain foreign countries should be disinfected by exposure to steam under pressure, in such a manner as to secure the exposure of every part of the bale or parcel and every article therein to a temperature of not less than 212° F.; but that in view of the representations which the Board received as to the difficulty of carrying out such disinfection, the order was rescinded as regards rags packed in bales and imported as merchandise by the Board's order of 7th August, 1893.

(Signed) JOHN LITHIBY,
Assistant Secretary.

E. WHITE WALLIS, F.S.S.,
Secretary to The Royal Sanitary Institute.

THE ROYAL SANITARY INSTITUTE,
72, MARGARET STREET, LONDON, W.
May 11th, 1905.

TO THE SECRETARY,
LOCAL GOVERNMENT BOARD.

SIR,

The Council of The Royal Sanitary Institute have had before them the communication from your Board dated 8th December, 1904, with reference to the resolution passed at the Congress of the Institute held in Glasgow, relative to the sale and use of unwashed flock, and asking what steps the Council considered might be taken, having regard to the difficulties mentioned in the report by Dr. H. T. Parsons dealing with this subject.

The Council have carefully considered the report referred to, and have also had before them the report issued in 1897 by the Departmental Committee appointed to inquire into the conditions of work in wool-sorting and other

kindred trades. Further, they have taken into consideration the experience gained by large towns where the trade in rag flock is carried on.

The Council are of opinion that the sale of unwashed flock constitutes a serious danger to the public, in that they are thereby exposed to infection, and in view of the fact that the better-class flock is subjected to a preliminary washing, they consider that in the interests of the public health all rag flocks should be washed for ten minutes in boiling water.

The Council consider that this precaution would very materially reduce the danger of infection arising from the use of unwashed flock, and should not be open to the difficulties referred to in Dr. Parsons' report.

The Council understand from information before them that the addition to the cost of the flock by washing has been considerably reduced since the publication of Dr. Parsons' report in 1887, and they do not consider that this should act as a deterrent to the carrying out of a measure which, in their opinion and in the opinion of the municipal officers at the Congress, is of importance in the interests of public health.

(Signed) E. White Wallis,
Secretary.

Local Government Board,
Whitehall, S.W.
29th May, 1905.

Sir,

I am directed by the Local Government Board to advert to your letter of the 11th inst. (No. 178 F), and in reply to state that the sale of unwashed flocks could not be forbidden under the present law, except in cases where such flocks could be proved to have been exposed to infection from some dangerous infectious disorder.

I am, however, to add that the point has been noted for consideration in connection with any proposed amendment of the Public Health Acts.

(Signed) Noel Kershaw,
Assistant Secretary.

E. White Wallis, F.S.S.,
Secretary to The Royal Sanitary Institute.

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OF

ROYAL SANITARY INSTITUTE

IE WATER SUPPLY PROBLEM IN RURAL DISTRICTS.

3y Prof. G. SIMS WOODHEAD, M.A., M.D.
(FELLOW.)

Read at Sessional Meeting, Cambridge, July 15th, 1905.

. THRESH, in the Preface to his valuable work on Water Supplies, says: "It is now fully recognised that an abundant supply of pure is an absolute necessity for the preservation of health, and that one e chief duties of all sanitary authorities is to see that all the itants of their districts have, within a reasonable distance, an .ble supply of wholesome water wherever such can be obtained at a ıable cost."

›me years ago it fell to my lot to have the opportunity of examining siderable number of water supplies, especially those of large towns. e North the moorland reservoirs afford such admirable natural sup- that those who are acquainted with these only can have little idea e difficulties met with in some of the Southern Counties, especially : water-bearing strata are too near to, or too great a distance from, ırface, and in districts where the population is scanty or the rateable low. During the last few years I have again been brought into ct with water supplies of different character, and have become inted with the tremendous difficulties encountered by many rural rities when making an effort to obtain adequate and pure water es. In most matters I am somewhat of an optimist, and am inclined ›k upon my fellow man as one to be trusted, and one who is not so ›ed up in his own interests that he will allow selfish considerations to too greatly with him in deciding matters that affect himself and his 's. I am bound to say, however, that as regards water supplies,

communities, perhaps even more than individuals, are often absolutely selfish and inconsiderate. The man who has a water supply, or a community in the same position, is the Greek who looks upon this supply as something that he has acquired as a natural right, and maintains that the outer barbarian in the next parish can have no sort of claim to share it, at any rate in the same pure condition in which it came to him. He is careful to take out his own supply above his town or village, and, as a rule, he returns to it his sewage in a more or less crude form. Were this confined to rivers and streams it would be bad enough, but when springs and wells of one district are contaminated by the sewage of another, the problem of obtaining pure water becomes a very difficult one indeed. It has been maintained, of course, that large cities are at a great disadvantage as compared with rural districts, but most of those who have given any consideration to the matter have come to the conclusion that the problem of the water supply in rural districts is a much more pressing one than is that of the supply to the large manufacturing towns, though here undoubtedly, as the best catch-water areas are gradually acquired, something will have to be done ere long to keep the sewage from what at present are looked upon as outside the possibility of becoming water supplies. As illustrating what I have to say to-day, I should like to take two areas of which comparatively recently I have had some experience.

The first, in connection with which I hoped that my friend Mr. Ware would have been here to supplement my casual remarks, is the water supply of Maidstone, which, though not a rural supply in the ordinary sense of the term, is essentially rural in so far as the method of water collection is concerned. At the time of the well-known outbreak of typhoid fever the water came from many sources. On one side of the town it was derived from three springs in the Lower Greensand, whence it was collected and run down to a series of tanks near the river. On its way down it was joined by the water from a couple of what were practically surface wells near, though not actually in, highly-cultivated land. Then, coming down to the same storage tanks or reservoirs, was the water collected from a series of springs from alongside the railway, which at this point is a little higher than the River Medway. Into some of these springs water from disused wells, which had communication with the surface, ran. Many of the springs were sealed and so far were effectually protected; but it was not known at the time that any of the springs drained the old wells, though some of the wells appear to have run dry when the railway cutting was made. On the other side of the town water was collected from what are called the Boarley Springs, at four points, and

three points from springs at Cossington. At Boarley there was a large ervoir which supplied part of the town by gravitation, some of the ssington water being distributed along with it. This water is then con-ed to a pumping station at Forstal, by the Medway. At Forstal, , a deep well was driven down through the Lower Greensand; from s a somewhat plentiful supply was obtained.

At Barming is a reservoir of considerable size to which the water from Ewell springs was pumped, and to which also a certain amount of ssington water was raised. This gave a general supply by gravitation, ecially to the higher parts of the town. The water from all these irces was, from a chemical point of view, of excellent quality, and most it also from the bacteriological point of view; but in the surface wells l in some of the springs, especially those which had their outcrop along railway, there were certainly more bacteria present than was desirable. tested by the older methods of examination, the water was good, ugh in the light of more recent experience, there were certain weak nts in this supply.

For the benefit of those who may have similar supplies I should like mention how the Water Company, through Mr. Ware, their engineer, isidered it necessary to deal with their supplies after the outbreak of typhoid epidemic. They began by cutting off the surface wells in Farleigh district, at the same time eliminating the railway springs, ing only the water that came from the Greensand. In order to improve s water, of good quality to begin with, they laid down a couple of ellent sand filter beds, and constructed a covered-in clear-water tank m which the water could be pumped directly up to the Barming servoir. This water, regularly examined chemically, and bacteriologi-lly at intervals, was not entirely satisfactory at first, but after the old mp-hole had been cleared out, iron being put in to replace wood every-iere, a very pure and stable water was delivered. I may state that the ters are allowed to run for a whole year before they are "skinned." iis, I believe, is one of the most important factors in the purification of ch water. In warm weather the filter beds are literally forests of gous growth swarming with micro-organisms, but the water in the clear-ter tanks is limpid, free from micro-organisms (with the exception of ew water organisms), and of excellent chemical composition.

Coming now to the springs at Cossington and Boarley, I may state that st of the collecting wells were already closed in and sealed down, but it s evident that water that had come to the surface could afterwards ke its way to these collecting wells. Moreover, none of the wells or

springs of these surface drainage areas were fenced off or specially protected, and though they were far distant from any habitation, they might, of course, be visited by tramps or others passing from the roads to the fields in which these collecting wells lay. In order to protect the wells and springs, Mr. Ware has had strong fences carried round all these areas between the outcrop of the water and the collecting well. Moreover, he has filled up the space between the outcrop and the well, first laying down clean chalk, and then on the surface of that hundreds of loads of fine white sand, with sufficient soil to afford nutriment to a close crop of grass. By these means he has obtained within his fences about as perfect a filtering area as it is possible to obtain. We know, as was especially insisted by Dr. Vivian Poore, that a layer of good close vegetation, especially of grass, is almost as good as the algous growth that we see on the surface of an ordinary sand filter, and this layer, with the sand and the rammed chalk, constitutes a protective layer certainly equal to the best sand filter made. As regards the protection of the well-head, most efficient precautions have been taken to prevent anyone tampering with the seals. Small brick "cabins," with thick concrete roofs, concrete raised thresholds, and thick oak doors with strong locks now protect the well-heads. One of these is placed at the highest point of each of the filter-beds, so that contamination through the opening of the well is practically impossible. Anyone who has to deal with a water supply similar to that at Maidstone would, I am sure, learn something from a visit to these collecting grounds.

Of the larger supply now obtained at Forstal it is scarcely necessary to speak, as it could only be obtained by, and supplied to, a wealthy district.

The second district of which I should like to say a few words is that in which we are discussing this question. In my report in 1900 to the Public Health Committee of the Cambridgeshire County Council, I wrote:—

"The water supply of the county is very unequal, both in quantity and quality, in different districts. In the western portion of the county, where the whole of the water supply is practically derived from shallow surface wells and pools, it is necessarily of very inferior quality. On the other hand, in Cambridge itself, and in other parts of the county, there is an admirable supply to be obtained, either from the Chalk or Lower Greensand formations. In fact, there is sufficient, if it could only be properly distributed, to make up for the deficiencies of the western portion of the county. With these difficulties in view, it would be well if some arrangements could be made to obtain a common supply for the county, or for the transmission of water from those areas more plentifully supplied

to those in which the supply is short or bad. A good and pure water supply is an essential factor in the preservation of the public health. Its absence from one community may render that community a source of danger to others, and in this sense the common welfare of the county is at stake. *The question of the water supply should, then, be looked upon as one of common interest, and therefore one which ought to be dealt with as a whole by the county council.* This question of water supply is one of the most pressing with which the county has to deal, and the sooner some common action can be taken, the greater will be the prospect of ultimate success, and the less will be the expense."

Since this was written a commencement has been made, and certain data as to the water supplies of the county have been collected by the medical officers of health.

Cambridge itself is exceptionally fortunate in having an abundant supply of water in a Chalk well at Fulbourn, and in wells from the Chalk and Lower Greensand at Chery Hinton, though even in Cambridge, until the Fulbourn supply was obtained, there was considerable difficulty in meeting the various demands made. When, however, we come to the rural district, one is simply horrified at the shifts that have to be made to obtain water even of moderately good quality. Dr. Anningson and Dr. Armistead could give us the names of villages, the inhabitants of which depend entirely for their water supply on surface wells, many of which are contaminated with sewage. In other instances, especially in the case of detached groups of houses, ponds, rivulets, and ditches, many of which are completely dried up in the summer, are practically the only water supplies to be obtained, and some years ago I was taken by the then Chairman of the Cambridge County Council to see a water supply that was in constant use, which, on bacteriological examination, gave a number of micro-organisms as great as one usually finds in dilute sewage. Not far from this room is an isolation hospital, which is nearly half a mile as the crow flies, and a considerably greater distance by road, from a road-side pump which is the only reliable supply for the water to be used in the hospital, whilst in the same district, the workhouse, until comparatively recently, was entirely dependent upon what one may call a scratch supply. As already stated, certain of the rural districts are dependent upon surface wells for their water supply, and I may add that the condition of some of these wells from a bacteriological point of view is almost beyond description.

We are told that it is impossible to do anything with these districts. Well, if these districts are to be left to themselves and could be entirely

isolated that may be true enough, but I maintain that larger communities, even in their own interest, have laid upon them the duty of taking up this question of water supply to their poorer or more scattered brethren. Every case of typhoid fever is not only a source of direct expense to the country but is a possible centre of infection for far wider circles than is usually appreciated. An agricultural district far away from London may through its contaminated water supply become a centre of infection to the area in London to which milk from that district is distributed, and what applies in such an extreme case may apply still more directly to other agricultural areas and towns. So firmly convinced am I of this that I am gradually coming to be of opinion that the question of water supply is one to be settled not by individual communities but by a National Water Board with County Committees. In Cambridge we have water for the whole county and some to spare for neighbouring counties, but until they know what is really required for the county, and until some perfectly independent Board can take up the matter, it is not safe for the Cambridge authorities to allow any tampering with their sources of supply. In the hilly districts and even in certain of the low-lying districts water is to be obtained from Chalk or from the Greensand, and here the problem is a comparatively simple one. But what is to be done in areas of low rateable value where it is necessary to bore deep wells at great expense if anything but surface water, often highly contaminated, is to be supplied? If there could be some combination between a number of these areas, if the matter could be taken up by the County Council, something might be done; but until we have some central organization through which a readily available supply can be distributed as widely as possible, we shall never have the best available system carried out. Even short of this, however, some centralisation is necessary, especially in advising and helping less wealthy communities.

Dr. Thresh writing on this question says: "The supply of water to rural districts is a question which has engrossed the attention of medical officers of health ever since such officials were appointed, but too often they have been satisfied with merely reporting that water supplies were unsatisfactory. Such reports are not sufficient to overcome the apathy of sanitary authorities, or to arouse any great interest in the subject in the districts concerned. The medical officer must not only prove that the present supplies are inadequate in quantity or unwholesome in quality, or both, but in conjunction with the surveyor he must be prepared to formulate a scheme and to prove that it is practicable."

Dr. Vivian Poore has pointed out that it is possible to protect even

urface wells against contamination, and I am satisfied that some such nethod of filtration as that adopted at the Boarley and Cossington supplies Maidstone) might, with great advantage, be adopted for surface water in listricts that at present are entirely dependent upon highly contaminated urface wells. With these grass and sand filters the rain-water collected n the roofs of houses might be much more utilised than it is. Accepting he fact that surface water is the most dangerous water with which we lave to deal, we may also accept Dr. Poore's statement that a layer of ctive vegetation will, in most cases, purify water better than, or as well s, the best sand filter extant, and if the two are combined, as at Maidstone, I believe it is possible to have wells or tanks of filtered water vailable at comparatively trifling cost, and therefore suitable for small communities. If these wells and filter beds are placed at the bottom of lollows, and if the water from the roofs of houses can be conveyed to hem, or if the surface water from land not too highly cultivated can be brought to such filters, an excellent supply could be obtained—except, of course, in very dry weather. Even then the water from ponds might, fter preliminary sedimentation, be placed on these filters. I only suggest this as a temporary measure, and where people are in great difficulties, as lmost any kind of water may be purified in this way, especially after a preliminary rough filtration through sand to keep back such matter as would clog the soil on which vegetation is growing.

I think it must be recognised, however, that we are gradually coming to a point at which the selfishness of communities must be counteracted by the constitution of some central organisation, which shall be empowered to control water supplies and which also shall be empowered to prevent the contamination of any possible supply with sewage. I am aware that certain well-informed authorities maintain that our rivers are our natural drains. With Lincoln before us we are apt, and I think very justly, to be very sceptical on this point. I venture to think that most of us are of opinion that rivers are natural water supplies, and that they have only been converted into drains because people have not had sufficient foresight to see that in time we shall not have sufficient water for our growing population without them. If water-bearing strata, strata containing only filtered water, were always accessible, then we might convert our rivers into drains. But as that is not the case, we must keep our rivers as clean as possible, so that we may be able when necessary to throw their water on to more or less perfect filters, and so obtain a potable water. As regards our rural districts, I am satisfied that co-operation and filtration are our passwords, and that as regards urban districts we must also ask

for co-operation; and with the aid of co-operation we must obtain purification. We have still plenty of water, even in dry years, if what we have can be properly purified or kept pure and equitably distributed. I might give you an account of a number of schemes adopted in rural districts, as at Nantwich, Maldon, Chelmsford, Cressbrook, Sieblade, etc., but as these are so fully described by Dr. Thresh in his chapter on Rural and Village Water Supplies, I refer you to his excellent little work on "Water Supplies"* for the description of such schemes. Where a pure water supply is concerned, cost should scarcely be a factor to be considered, though with co-operation the cost of a good water supply should never be greater than even small communities could easily bear.

I have already mentioned the fact that a bad water supply on a farm may have far-reaching consequences, and it would be well that rural authorities should remember that the general health of their animals and the prosperity of their trade depend upon a good water supply. A short time ago this latter fact was brought home to me very forcibly, when I was informed by a large London milk company that they had been unable to accept the milk from certain farms within a short distance of Cambridge, because they found that the water supply was far from satisfactory. I suppose that as the Londoners will not have our milk, we consume it ourselves, and with it any organisms and organic matter that may be introduced with the water.

Finally, whatever difficulties we may have to overcome in the way of obtaining water, of storing, filtering, and distributing it, the key to the whole position is combination, co-operation, and centralisation; and I wish to ask those interested whether we could not formulate some plan by which the Cambridge rural districts could be supplied with good water and plenty of it. If we could do it for Cambridge, the problem would be solved for many other counties. Dr. Thresh is preparing for this in Essex.

* Rebman: London, 1901. Third Ed., p. 469, et seq.

[*For Discussion on this Paper, see page* 436.]

THE INTERPRETATION OF THE REPORTS OF WATER ANALYSES.

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WHEN I read Professor Woodhead's paper on "The Water Supply Problem in Rural Districts," I thought that in order to illustrate the chief point he makes with regard to co-operation, I might give the analyses of the waters from two village pumps which he and I examined some two or three months ago. These pumps supplied two villages in the South of England.

	A.	B.
Free Ammonia	·060 ...	·068
Albuminoid Ammonia	·156 ...	·552
Chlorine	51·200 ...	4·500
Oxygen absorbed in 3 hours at 80° F. ...	·100 ...	·070
Nitrogen as nitrates	·800 ...	·800

You will notice the very considerable amount of the two ammonias in A, almost by themselves sufficient to condemn the water. You will notice the enormous amount of chlorine. I put these numbers in parts per hundred thousand, not in grains per gallon. You will notice that the oxygen absorbed is large. I do not suppose that the whole of the chlorine comes from sewage contamination, or from surface water contamination. I am inclined to think there is a deposit of some salt of chlorine in some stratum through which this well is bored, and that it is partially dissolved by the water in the form, say, in part of ammonium chloride, or it may be, in part, of other chlorides. I do not think it is wholly ammonium chloride, because I think the amount of free ammonia would then be

considerably larger. Of course an analysis of the mineral constituents is necessary to decide. You will notice that the amount of nitrogen as nitrates is very high. Now, taking the analysis as it stands, the water must be condemned for drinking purposes. Also, not only does the chemical analysis condemn the water, but Professor Woodhead condemns it from a bacterial analysis.

The water **B** is also from a village pump in the South of England. You will notice again the large amounts of the two ammonias and of the chlorine, and also the suspicious amount of oxygen absorbed. I have very little doubt that this well water is contaminated either by sewage or by surface drainage. Bacteriologically Professor Woodhead confirms the judgment that this is a water which must be condemned. These analyses are two of four waters of four different village pumps, all of which were condemned. I have no doubt that the number can be multiplied by a thousand, or even by ten thousand, where people are regularly drinking water bad for their health. All over England people are regularly drinking such foul waters; and the wonder is that epidemics are not more frequent. I do not say the people would suffer from typhoid or any other bacterial disease, such diseases would show themselves sooner or later, but I do say that water containing such large quantities of organic matter tends to lower the system in such a way that it would never be normally strong, and also be a cause of a tendency to infection. As a fact, several people had suffered from diarrhœa caused by drinking these waters. These two instances illustrate Prof. Woodhead's argument with regard to co-operation; that if you want a hygienically pure water, the best plan would be to have some central organisation which can supply a large area. You will then get a constant supply. You could take the proper steps to see that the supply is always chemically and bacterially pure; and you can much more easily trace the advent of any dangerous appearances in the water, and so lessen the chances of the spread of infection, and you would also raise the general standard of health. I think that the supply of good sound water should be as much the care of a central authority as is the supply of a good education. It is to be hoped that steps will be taken by some such bodies as the County Councils to realise this supply.

My own particular part of the discussion is to illustrate the limitations in the reading of reports of water analyses. With regard to the two waters, **A** and **B**, there is no doubt that both would be condemned. But that is not always the case. The reading of a report is not always so easy. Sometimes a medical officer of health has to deal with the analysis

of a water which does not tell so clear a tale. On the other hand (and this is the result of my own experience) a water on analysis sometimes appears to the chemist as exceedingly dangerous. What I mean is this: I have here a water analysis, the figures of which I extracted from an official report—

	C.
Free Ammonia	·004
Albuminoid Ammonia	·014
Chlorine	2·100
Oxygen absorbed in 2 hours at 80° F. ...	0·124
Nitrogen as nitrates	0·285
Microbes	214 per cc.

In this analysis you will notice that the two ammonias are rather high. A chemist taking the analysis by itself would look upon the water suspiciously. The chlorine figure is not high. On the other hand, the oxygen absorbed, a most important factor in a chemical analysis of water, is very high. Now, taking these three constituents by themselves, and comparing each with the others, a chemist would, I venture to think, condemn the water as suspicious. I certainly should. What is the result of the bacterial analysis? Notwithstanding the three high figures just mentioned the bacterial analysis is low; that is to say the water contains 214 microbes per cubic centimetre, and I believe this figure would be passed by the bacteriologist. The water was supplied to the East End of London when this analysis was completed, and it is a good water. So far as I am aware no typhoid disease nor any particular bacterial disease which might have its origin in bad water was prevalent in the East End as a result of drinking this water. My point is, that if you take the chemical analysis of this water by itself, a chemist would reasonably view it with grave suspicion, even if he might not condemn it.

Now consider the next water analysis—

	D.
Free Ammonia	·0016
Albuminoid Ammonia	·1260
Chlorine	2·0000
Oxygen absorbed in 2 hours at 80° F. ...	·0970
Nitrogen as nitrates	·450

This analysis is my own. You will notice that the free ammonia is rather low. It is more or less well within the danger line. The albuminoid ammonia is very high, and by itself a chemist would view it with grave

suspicion. The chlorine is low. The oxygen absorbed is suspiciously high. Nitrogen as nitrates would pass. There would be no danger there. Taking the analysis as it stands then, it might be argued that these figures might be due to vegetable contamination. It might be so. But a chemist would, at any rate, argue that the albuminoid ammonia and the oxygen absorbed are higher than a normally good water should show, and until I knew more of the history of the water I should be inclined to condemn it. Now this water was supplied to the city of Westminster at the time of the analysis, and so far as I know was a good water from a hygienic point of view, anyway, no bacterial disease was prevalent at the time. My argument is, that looking at the water from a chemical point of view, and knowing nothing of its origin or its distribution, you would look upon it with a certain amount of suspicion.

Take another water, E—

	E.
Free Ammonia	·0032
Albuminoid Ammonia	·1400
Chlorine	5·2000
Oxygen absorbed in 2 hours at 80° F. ...	·0130
Nitrogen as nitrates	·0200

This is a water which I also analysed. I knew nothing about it: purposely I was told nothing about it; nothing of its origin; nothing of its history. You will notice the free ammonia is fairly low; you will notice the albuminoid ammonia is very high; you will notice also that the chlorine is very high; the oxygen absorbed is not dangerous, in fact, it may be considered to be low when compared with the figure for the albuminoid ammonia. The nitrates are negligible. Now, viewing the analysis from a chemical point of view, and knowing nothing of the history of the water, you would condemn it; primarily, because of the high albuminoid ammonia, and secondly, because of the chlorine. It is true there might be some deliberation in the final judgment, because the oxygen absorbed is rather low, but taking it as a whole the analysis tends to show, I think, that it is a dangerous water. Well now, what is the history of that water? It is a deep-well water coming from the Lower Greensand. The high chlorine figure is probably explained by the origin of the water from the Greensand strata. As you know, the Greensand contains a large amount of chlorine as chlorides; also, the albuminoid ammonia is possibly due to some vegetable contamination. If it were not due to vegetable contamination the chances are that the oxygen absorbed figure would be considerably higher. My point is that looking at the

analysis as it stands you would condemn the water as being suspicious, and you might easily condemn it as dangerous. Previous analyses had been made of this water, and they showed by the two ammonias a considerably greater contamination. The well was put in good order, and the analysis E is the result of an analysis completed some weeks later. It showed that the two ammonias were going down as compared with the previous analysis. I venture to think, if the analysis had been repeated, as it ought to have been repeated, some five or six weeks later, that the figures would have been considerably lower. Anyhow, there was no epidemic due to any bacterial diseases.

The principal point I wish to make with regard to these three waters is that, taking the analyses by themselves, you cannot deliver a *final* judgment as to whether any of them is good, bad, or indifferent. If you get similar analyses you will probably look upon the waters with grave suspicion. And so I think that some rules are necessary with regard to the instructions to the chemist, some of the more important of which I now suggest.

1. I hold that the chemist should know the whole history of any water given to him for analysis. As I say, I condemned the water E as dangerous. The condemnation was only modified when I knew the complete history of the water. Therefore I say, if you are to have any satisfactory results from the figures of a water analysis, the chemist should know the geological character of the particular district. He should know the general saline constituents of the geological strata, because, if you look at table A as an example of what I suggest is possible in solution, you might get considerable amounts of chlorides in the strata which would contaminate, as it were, the particular water. Only a few months ago I examined a deep-well water of which I knew nothing. Chlorine as chlorides amounted to some 25 parts per 100,000. The amount of free ammonia and the amount of albuminoid ammonia were proportionately large. The oxygen absorbed was exceedingly small. For a time there was some difficulty in reconciling the figures of the analysis. Finally it appeared that in this well there was no sewage contamination, and no surface contamination. The cause of the large amount of chlorine as chlorides, and the free and albuminoid ammonias, was due to the fact that the water had dissolved out of the strata a definite amount of ammonium chloride. Now, as chemists know, ammonium chloride is easily disassociated or decomposed, and part of the ammonia comes over as free ammonia. It does not end at that. The ammonia distills very slowly but continuously, and you finally give it up as endless, and proceed with the albuminoid

ammonia distillation. It is then found that the alkaline permanganate turns out a large quantity of ammonia, which is put down as albuminoid ammonia, whereas, as a matter of fact, it is nothing but the residuum of the original ammonium chloride. Therefore, I say, a chemist should know the geological history of the water he is to analyse. He should know where it has come from.

2. He should know the method of storage; he should know how it is stored.

3. He should know the method of distributing the water, because, as you know, there are serious sources of danger arising from imperfect storage.

4. He should also know the rainfall just before the analysis is made. If you get a heavy rainfall just before an analysis you generally find that the amounts of the constituents differ very considerably from an analysis completed before the rainfall.

5. The chemist should visit the place himself. He should see the outlet; he should examine the surface drainage; he should see the cover of the wells. He should see if the gathering ground is properly guarded, and if it comes up to the ideal condition of water supply and protection mentioned by Professor Woodhead. He should see if the well is as properly protected as Professor Woodhead's example. If he does not, depend upon it there will be some doubt in his judgment of the analysis.

6. Also, I do not hold that a chemical analysis is sufficient by itself. I think a bacterial analysis should always be completed as well. Nor should the final judgment rest with the chemist. The final judgment should rest with the chemist and bacteriologist in collaboration. A bacterial examination should be done, because, as you know, you may have a water which, from a chemical point of view, is organically pure, but it may still contain germs of disease. On the other hand, you may have a water bacterially pure, but which may, from a chemical point of view, be suspicious, or even dangerous. I do not say either will often occur.

7. Also both chemical and bacterial analyses should be done regularly and frequently, as is done in London.

There is just one word I would like to say with regard to the hardness or rather the softness of water. This is a danger which I think has been rather neglected. The more dramatic action of bacteria has, in these later years, tended unconsciously to put into the background dangers which may arise from the use of soft waters. Take for example this particular water:—

	F.
Free Ammonia	·002
Albuminoid Ammonia	·066
Chlorine	1·600
Oxygen absorbed in 3 hours at 80° F. ...	·003
Nitrogen as nitrates...	·160
Hardness—all permanent	6·000

The free ammonia is low. If you compare the albuminoid ammonia with : oxygen absorbed, it is possibly due to vegetable contamination, as is .icated by the low figure for the oxygen absorbed. The chlorine figure :xceedingly low. The danger arises, not from the organic constituents, t from the softness of the water. Its hardness or softness is de- mined by the low figure of 6. It is a dangerous water. In such a ter, in continual use and distributed through lead pipes, the danger is ıt the water might dissolve a certain amount of lead. A striking ımple of this particular danger occurred in my own experience. A ter was sent home from a Dartmoor district, and what was the result of : analysis? As regards the organic constituents the analysis showed t it was a very pure water. It was almost wholly free from the two monias. The chlorine was about 1, and the oxygen absorbed was very ıll. I found on further investigation that it contained half a grain per lon of lead, dissolved by the water from the lead pipes. Now this district l not suffered from lead poisoning as far as I know; but it had suffered, l may be suffering now, from a species of gout. I do not know if gout ı result of lead-contaminated water, but the fact remains (it may have :n a coincidence) that in this particular district some forms of gout re strongly prevalent. I am inclined to think that the gout was due the large quantities of lead contained in this exceedingly pure water.

Therefore, apart from the general principles which we have been cussing with regard to organic pollution, I say that not only must the ganic pollution be taken into consideration, but also the hardness or tness of the water. If a water analysis shows that although the organic ıstituents may be exceedingly low, the hardness is also exceedingly low, n I think it is as much the duty of the Medical Officer of Health to ɔt to the dangers which might arise from lead poisoning, as it is to stress upon any possible dangers from the organic constituents.

Professor McKenny Hughes (Cambridge) thought that in such questions as water supply, the advantages of co-operation between those who followed different branches of scientific inquiry must be obvious to those who had listened to the two papers just read, and he was entirely in accord with Professor Sims Woodhead and Mr. Purvis that there should be co-operation also with regard to the practical carrying out of schemes for the supply of water. The population shifted about from areas where water was abundant to areas where it was scarce, and the question of the supply of water should not be left to the discretion of ignorant people or the liberality of corporate bodies. They already recognised control in details of municipal life. No one was allowed to erect a building in Cambridge in such a way as to interfere with the traffic or public convenience generally. Everyone had to submit plans to the Town Council specifying what he proposed to do. That was not left to the public spirit of companies or of individuals. There would be no greater hardship in having to submit every scheme for wells or drainage in town or country to a properly constituted authority. When a man sunk a cesspool his object was to get rid of liquid, and so he went down till he found a stratum so pervious that it would absorb and carry it all away. Another man close by wanted water for domestic purposes and, knowing nothing of the cesspool, sunk a well down to the very same porous stratum and drew polluted water. The methods adopted for the purpose of preventing surface contamination at Maidstone would not do for the neighbourhood of Cambridge. Of course, when mischief had been done, and could be proved, there were authorities who might be appealed to and who could take action, but more than that was wanted. They wanted prevention, not cure only. No well or cesspool should be sunk without being duly registered, as underground workings were, in a mining record office, for the guidance and protection of later explorers. He would, however, go further than that, having regard to the larger centres of population as well as to rural districts, to which it more obviously applied. He thought that there ought to be a competent body to control the water supply of the whole country. It ought not to be left as now to be scrambled for. They might not be able to formulate exactly what the constitution and powers of that body should be, or the nature of the control exercised, but there should be some central authority for drawing up a general scheme for the distribution of water to the great centres of population and to every homestead. Large water schemes were brought before Parliament and, if there were no objections to the character of the water and the financial proposals, they generally got through, but there was no office or minister whose duty it was to control the distribution of this, the most essential material of our individual and common life. Thus we had valleys in Wales dammed up, and lakes in the north of England raised, without any general scheme being worked out by which it might be possible to allocate the sources of supply in a less extravagant manner, to feed the smaller towns and rural

stricts on the way, to provide everyone with water, the chief necessary of life, ıd to save thousands (especially of the poor) from being poisoned. The evil as very insidious; a mild attack arising out of neglect of precautions might be ınded on in a more virulent form, and even where no fatal or serious conseıences followed, there was often a general lowering of vital energy which ight lead to dangerous results. Nature, however, was very kind and removed any a source of danger to which they had laid themselves open. For instance, a ıarter-mile of tumbling water would, he believed, oxidize the sewage of a town large as Cambridge, but the gently-flowing Cam could not do that for them so pidly. Then their porous strata provided an excellent filter, placed by Nature the path of percolating waters; and even when they had got some of the evil icrobes into them, they often did no harm, as they did not find a suitable soil. ıt they should not presume upon that frequent immunity.

MR. HERBERT GEORGE FORDHAM (Chairman, Cambridgeshire County Council) ferred to the tables exhibited by Mr. Purvis, and asked for some explanation of ɔxygen absorbed" as a factor in analysis of water for organic ingredients, suming that the absorption was not mechanical but purely chemical, and was lopted as a measure of the amount of organic impurity neutralized by the ɪsorbed oxygen, based on some quantitative standard. Speaking on the ɔsition of County Councils as controlling authorities in matters of public ealth, he pointed out that, though their powers under the Local Government ɩct, 1888, are extremely limited, under the Act of 1894 they can, in the event ɪf a proper complaint being lodged with them, and its allegations being sustained ɔn a public inquiry, deal in a very drastic and complete manner with any district ɔouncil which fails to discharge its duties under the Public Health Acts. No ɔmplaint in this matter had, however, come before the County Council of ʾambridgeshire at any time. He pointed out also that a County Council having ᴑ act upon such a complaint in a judicial spirit, and to establish the facts of the ıse as between the parties, cannot with propriety initiate any such proceedings, ıd that thus, for want of a complaint, cases of default of minor local authorities ıy not receive adequate attention. In matters of general sanitation he ɛntioned the important powers of County Councils for the promotion of a neral system of isolation hospitals, which can be made effective by a wellranged plan of contributions in aid of buildings and equipments from the neral county fund, and emphasised the practical value from the point of view sanitation and Public Health of the Midwives Act, 1902, as administered by ıe Central Midwives Board (upon which body he is the representative of the ounty Councils Association), and by County Councils as the local supervising ıthorities. He dealt finally with the administrative difficulty arising from the on-natural character of the county area as a water-control district in reference ᴑ watersheds and hydro-geological basins, and expressed the view that adminisrative efficiency could only be completely secured by the creation of natural

areas, combining watershed boundaries as closely as practicable with those of unit areas of underground water supply.

Mr. Joseph Martin (Chairman, Isle of Ely County Council) said he must take exception to the suggestion that, when a sample of water was sent for analysis, the nature of the soil and other surroundings should be given, as he considered that such information might more or less influence the analyst in making his report of the purity of the water. Doubtless the water supply to villages and small towns was one of the difficult questions of the day, especially in the Fen district in which he resided, as the expense in procuring water from the Chalk or Greensand was prohibitory. The rivers were the natural supplies of water, and he considered that power should be given to some authority to enforce the Rivers Pollution Act (1875) without having to obtain an injunction, which was always expensive and slow in progress.

Dr. Leonard P. Kinnicutt (Worcester Polytechnic Institute, Worcester, Mass.), said he had listened with great interest to the two papers, and had enjoyed greatly the privilege of meeting so many men well known in the United States for their work in sanitary science. In America they looked up to the work that had been and was being done in England, and studied most carefully the results of their work on sanitary problems. The danger from pollution of rural water supplies was most admirably described by Professor Woodhead, and what had been done in the neighbourhood of Cambridge to diminish that danger was a lesson showing what could be accomplished by local authorities. Would that the suggestion of Professor Woodhead as to central control of the water supply of the rural districts might, as it should, bear fruit. Typhoid fever, the most serious and the principal danger from the use of polluted water, was, he thought, not nearly so much an urban as a rural disease; the death-rate per hundred thousand of the living population was much greater in rural districts than in cities, and the cause of this was without question that water used for drinking purposes in the country was much more likely to be polluted than it was in the city. The character of a water supply of a city was known, and, if polluted, precautions could be taken regarding its use. In the rural districts (especially in the United States, where each householder was, as a rule, supplied with water from a well on his own land) the danger from pollution was very great. A well was dug without any regard to location, and in many cases one of the sources of supply of the water in the well was a cesspool sunk in the near neighbourhood. How this could be prevented was difficult to say. The authorities could certainly close the well if they knew it was polluted, but this knowledge was generally only obtained after a case of typhoid fever had caused an analysis of the water to be made. Much could be done in the United States if the Boards of Health had the authority to appoint inspectors, whom the householder would have to consult before sinking a well upon his land. Further, if

when a well was dug the plan mentioned by Thresh in his book on water supplies were more often followed (i.e., of filling the well to the height of high water with gravel stone, and from this point to the top of the well with sand, and sinking the iron pipe to the bottom of the gravel) danger of pollution of the water would be greatly diminished. Naturally following, came the question which had been so ably dealt with by Mr. Purvis in his paper, "The Interpretation of a Water Analysis." Dr. Kinnicutt agreed with Mr. Purvis when he said that whenever it was possible a survey should be made of the river, pond, lake, or well from which the water was derived; for very much depended on natural conditions surrounding the water supply as to the significance which should be placed on the data obtained in the analysis. Personally, he placed most dependence on the free and albuminoid ammonia, and the nitrogen as nitrites and nitrates; and not as much stress on the oxygen consumed. High free ammonia in ground water, without resulting from some explainable cause, was a danger signal, as was also albuminoid ammonia. In surface waters which had a high colour, high albuminoid ammonia was not so significant, as it might be due only to vegetable matter derived from peaty or swampy soil. Nitrogen as nitrites should certainly not be over ·0002 parts in 100,000 parts in unpolluted ground water; while high nitrogen as nitrates indicated that the water at some previous time contained unoxidised nitrogenous matter. Where the normal chlorine of the water in the region was known, as was the case in all parts of Massachusetts, the chlorine figure gave valuable information. The oxygen consumed he did not regard as so valuable a factor, as it only indicated oxidisable matter and gave no information as to whether it was of animal or vegetable origin; further, none of the methods in use for determining the amount of oxygen consumed gave the total amount, the amount found depending entirely upon the method used. A bacterial examination should be included in all sanitary analyses of water, the quantitative determination and the test for bacilli coli. He did not quite agree with Mr. Purvis as to what he said about soft water. For general household use soft water was to be preferred. There was no question as regards the action of soft water on lead, but lead pipes should never be used in wells, and a special iron pipe should be used for conducting the water inside the house for drinking and cooking purposes in the case of city supplies.

DR. W. ARMISTEAD (Stapleford) said that, as medical officer of health for a large area in the administrative counties of Essex, West Suffolk, and Cambridge, he had for more than 30 years been brought intimately in contact with the many difficulties which arise in connection with the water supply problem in rural districts. The real deterrent in connection with the adoption of a water scheme for a village was the cost, and when the village was situated on the high boulder clay area at an elevation of over 300 ft. above ordnance datum the difficulties were considerable; but they could be overcome, and had been overcome, by some of

the Rural District Councils, by boring 250 or even 350 feet through the Boulder Clay into the Chalk and lining the bore-tube with steel tubes, from which the water was pumped by a borehole pump into a reservoir on high ground and distributed in pipes to standpipes in the village; the power used for pumping being either an oil engine or a windmill. These schemes were, however, very costly for villages with a small population and a small rateable value. Some villages which were formerly supplied by shallow dug wells, liable to surface and sewage pollution, were now supplied by wells bored 100 feet or more into the Chalk and lined with iron tubes, the water where it rises to within 20 feet of the surface being raised by hand-pumps bolted on to the iron bore-tubes, so that there was no possibility of pollution. Some of these villages, which were formerly very liable to outbreaks of typhoid fever caused by pollution of the water supply, were now free from that disease. Other villages on the Gault had been supplied by wells bored through the Gault into the Lower Greensand, from which a good supply of soft water had been obtained. It was at first proposed to bring before the meeting the distribution of water in county areas. With respect to the administrative county of Cambridge, all the area to the south and east of the county could be supplied from the Chalk, the only questions requiring serious consideration being the best scheme for obtaining the water and the cost. He called attention to the fact that a few years ago two schemes were brought before Parliament for obtaining a large supply of water for South Essex from the Chalk in the watershed of the Cam. Fortunately both these schemes were successfully opposed, but similar schemes might again be brought forward if nothing was done to utilize this excellent source of water supply for the county, including that part of Essex which is in the watershed of the Cam.

Mr. J. L. Luddington, J.P. (Vice-Chairman, Ely Rural District Council) drew attention to a point connected with water supply which had not been touched upon, viz., the difficulties caused by the pollution of rivers. He lived in the midst of the fen country, where it was impossible to get water by sinking wells, and where the supply from any efficient springs would be from ten to twelve miles distant. A wide good river passed through the district, and seemed to form the natural supply. That, however, was polluted by a city about five miles higher up the stream, which poured its sewage in a crude state, and without any pretence of treatment, into the river. A strong representation was made to the County Council to put into operation the provisions of the Rivers Pollution Act, but this was refused, on the ground that the whole county would have to pay the expenses of it whilst only one village would benefit. Then an application was made to the Local Government Board to do it, but they refused to act, and the only course then was for the District Council to apply for an injunction, and this was thought too costly for them. The supply of water was of national importance, and that being so he considered that inspectors should be appointed

› see that matters like this were carried out and to help the local authorities. [is experience was that everyone was very ready to criticise. What was wanted 'as not merely criticism, but real help and advice. This seemed to him to be matter most closely connected with water supply in rural districts, and he 'as glad to have had a chance of bringing it before the attention of the ıembers at that meeting.

DR. BUSHELL ANNINGSON (Cambridge) agreed with Professor Woodhead that ne establishment of water boards would probably be needful to carry into effect is object of conveying water from an area of abundant supply to one of water-ss geological strata. There were many clauses in the Public Health Acts nposing on owners of houses and local authorities the duty of providing a suffi-ient quantity of pure water; but not one of them quite met the object indicated ı the paper; the only legal power for provision of water outside a district was ontained in section 61, Public Health Act, 1875: "Any local authority for the ime being supplying water within their own district may with the sanction of he Local Government Board supply water to the local authority of any adjoin-ıg district on such terms as may be agreed between such authorities or as in ase of dispute may be settled by arbitration in manner provided by this Act"; nd in section 63, which gave power to any water company to contract for he supply of water with any local authority.

MR. C. G. MOOR (London) said it was interesting to hear that a London ompany had refused milk from a Cambridgeshire farm on the ground of a ad water supply, and mentioned that at Oxford the local people, being unable o sell milk from a certain farm, sent it to London. He feared that all London ıilk-buyers were not so punctilious as the one referred to by Dr. Sims Woodhead. t had been stated by Mr. Purvis that organic matter in water was a cause of ill-ealth. This was the kind of statement that might be copied from one text-book o another, but he was not aware that any real evidence existed for it. In the ase of two waters referred to, it was mentioned that they were condemned alike y independent chemical and bacteriological examination, and he did not doubt ut that this would frequently occur. He had several times expressed a desire o see a tabulated statement of results on, say, a thousand samples, giving the acteriological and chemical results, together with a description of the surround-ngs of the source of supply, and a record as to whether the water in question ıad before or since produced ill effects on health. He desired to draw attention o the limitations of both bacteriological and chemical analyses, inasmuch that while both of these methods could point out danger, they could not logically be ısed as a guarantee of safety. Some persons having had a particular well nalysed, say a dozen years ago, would not hear of any possible danger in the uture, and regarded the certificate of analysis as a kind of magic charm against ollution for all time. As an instance showing the necessity of inspecting the

source of a river supply, Mr. Moor mentioned the case of a city deriving its water supply from a river which received a large quantity of sewage from a town some twenty miles away. The water was of excellent quality so far as chemical and bacteriological examination showed, but for all that there were periodical recurrences of small groups of typhoid cases, which appeared to coincide with the scraping of the filter-beds. This was probably the case in many towns which derived their water supply from rivers, as there could hardly be a river in the whole country that was not used as a sewage outfall by some of the towns or villages on its banks.

Dr. Savage (Colchester) remarked that the subject could be dealt with from two points of view, that of the analyst and that of the administrator. As one who had frequently to look at the matter from both standpoints, he felt he could better appreciate the difficulties of both, for although Colchester was an urban district, yet the area was very large, and comprised a considerable purely rural population. Speaking first from the administrative aspect, there was no doubt that in rural districts the question of a satisfactory water supply was often a difficult one. As a bacteriologist he had, not unfrequently, to condemn a rural water supply, and that might be a simple matter; but the difficulty was that after the water supply had been stopped, there was in many cases no other source obtainable, and the last state was worse than the first. He believed that one way out of the difficulty was in regard to better construction of shallow wells. Shallow well water is usually looked upon with suspicion, frequently with justifiable suspicion, but often it was the only source available. If, however, many of these wells were properly made, they could be used to give satisfactory and drinkable water. For example, about a year ago he condemned the water from a shallow well, which was thoroughly bad. That was an easy matter, but the difficulty was how to supply the two cottages concerned with pure water since no other source of supply was available, and to sink a deep well was out of the question. The drainage was badly laid and defective: that was relaid and made satisfactory, the well was deepened and made impervious to a depth of fifteen feet, with also a good backing of clay, while it was properly covered in and fitted with a pump. The water is now a satisfactory one. He was very glad to notice that such an authority as Dr. Thresh advocated the use of properly made surface wells in suitable cases. Among the administrative difficulties may be mentioned the peculiar wording of section 70 of the Public Health Act, 1875, which requires a water to be so polluted as to be injurious to health before the well, etc., can be closed. A water may be sewage polluted, but it is not so easy to advance evidence that that water is injurious to health, or to prove that the two terms are identical. Dealing with analytical questions, he could fully endorse Mr. Purvis's remarks as to the need of data giving the source, etc., of the water before the interpretation of the analytical results could yield their greatest value. The old bad notions were dying hard, and during the

past few years he had frequently had waters sent him for analysis about which he was refused any information, and was indeed looked upon with suspicion because he asked for it. For an important matter such as ascertaining whether a water was fit to drink or not, there was no doubt that the more information given the better, and results must always be interpreted in the light of topographical information. In regard to the methods of analysis, as he had frequently pointed out, he was convinced of the great superiority of bacteriological over chemical methods. The examinations made of the Bridgend water supply served as a good illustration of the relative value of these methods of investigation. The water supply was from springs issuing from the Carboniferous Limestone, and topographically, until condemned bacteriologically, no fault was found with it. In 1901 he condemned it on the results of its bacteriological examination, while the chemical analysis, made with similar samples in the same laboratory, showed no evidence of pollution. Right up to October, 1902, frequent examinations yielded the same results, the bacteriological data furnishing marked evidence of pollution, which the chemical analysis failed to show. Subsequently a Local Government Board Inquiry was held, and Dr. Klein's bacteriological examinations quite confirmed his results, while Dr. Bulstrode traced the contamination. What he liked to do in investigating a water supply was to go and personally examine the sources of the water and to collect his own samples for bacteriological examination, making also chemical examination if required, while of course for poisonous metals and hardness, chemistry alone was available. In regard to the vexed question of standards, chemical or bacteriological, there was no doubt that they were never absolute and only helps, useful if not pushed too far. It was impossible to set up absolute standards applicable to all waters.

MR. WEST KNIGHTS (County Analyst, Cambridge) entirely agreed with the previous speaker who said that it was impossible to fix any standard by which waters from all sources could be condemned: a feature that would be satisfactory in one water might absolutely condemn another. He was struck by the simplicity and apparent efficiency of the means adopted at Maidstone to preserve the various springs from pollution; and if the same could be applied to improving the purity of waters obtained from surface wells in isolated rural districts, he thought it would be extremely valuable in many of the villages around Cambridge. With regard to the interpretation of the results of analysis, apart from any outside information, it depended upon whether the analyst was required to pronounce judgment on the sample of water actually before him, or to predict whether a certain well would be capable in the future, next week, next month, next year, continuously to supply pure and wholesome water. He thought there was considerable difficulty in getting those particulars. Some years ago, the medical officer of health of a large borough, of which he was the water examiner, urged his town council to pass a resolution that those particulars should be supplied by the inspector with each sample. That resolution

was not carried: it seemed to suggest to the minds of the council that if the analyst could not condemn the water on the results of his chemical analysis, he was to be induced to do so on the outside evidence supplied by the person who took the sample, possibly a prejudiced person.

MISS C. COCHRANE (St. Neots) said that the carrying out of all satisfactory work must depend on individuals, and every individual there probably had some influence in his own village; and if so, should use that influence, in his own village if he had the courage, or in a neighbouring village. Much might be done at trifling expense, such as raising the tops of wells and putting a sound cover, replacing a worn-out filter bed, cleaning a drinking-pond, railing round one used by cattle, and also storing a larger amount of rain-water. It would, at all events, be something until the excellent suggestions of Professor Woodhead were carried out. Water supplies should be administered by County Councils or a still wider authority.

PROFESSOR WOODHEAD (Cambridge) said he was delighted that there had been such an interesting discussion on his somewhat disjointed opening remarks. Without attempting to answer the whole of the questions raised by individual speakers, he would try to clear up one or two points concerning which he had evidently not made himself clear, and to supplement what he had already said on two points. It was perhaps scarcely advisable to enter into the question of standards of bacterial and chemical purity, but he thought they were now fairly entitled to state that that was not now determined by the number of micro-organisms or the amount of organic matter that was met with in any single sample of water. They relied far more upon a "constant" condition, and if a water did not vary from time to time, and if by long experience he knew where the organic matter came from, and that the micro-organisms were all water organisms, he felt far more satisfied than he should with a very much better sample of which he had seen only a single analysis. Bad results always indicated a bad water, but good results obtained on one or two occasions only did not necessarily indicate that we had to deal with a good water. The number of organisms, say 100 per cc., may mean much, but it may mean very little, unless it be read in connection with the number of species, the kind of micro-organisms, their source, surface pollutions, sewage pollution, and so on. In all cases the constancy as to numbers of the forms of the micro-organisms, and of the total number and the constancy of the chemical composition, gave the most valuable information. He agreed with one of the speakers, who stated that it was necessary to combine the information that could be obtained from various sources, but a sharp line of distinction must be drawn between a request for a mere analysis and a demand for a reasoned opinion. It was for that reason that he was anxious that they should have a Central Water Board, consisting, say, of a chemist, a geologist, a bacteriologist, and a legal expert as a nucleus, with a

series of "local" members appointed by county authorities. They had been told that human nature being what it was, they would find it difficult to put into force the regulations drawn up by any central organisation. What he desired to see was a central organisation which had feelers thrown out in all directions, and he had a kind of latent hope that under such conditions official nature might to some extent counteract the baser side of human nature. It was his experience of the small powers possessed by County Councils that led him to desire that these powers should be increased either directly or indirectly, and as water-collecting areas were seldom the same as county areas, and as therefore there was necessarily great overlapping, he would like to have a central authority which could act with and control the county committees. The central authority would have before them all the information that could be obtained; they would be able to co-ordinate such information and to mete out justice, especially with the aid of those on the spot, who were acquainted with the exact requirements of the various districts. A minister of hydrology, as chairman of such a Board, would not have an easy time of it, but he would be able to accomplish work of immense value to the community. From the remarks of several speakers he thought that he could not have made himself quite clear on one point. They seemed to think that he wished to minimise the value of their surface supplies. His object, on the other hand, was to draw attention to the fact that in the fen district, for example, the rivers must necessarily be the main sources of supply, and it was for that reason that he desired to see these rivers protected from pollution. Moreover, he considered that surface wells might be utilised to a much greater extent than they were. He brought forward the evidence adduced by the late Dr. Vivian Poore on that point. It was for that reason, too, that he spoke of those surface filters and of pure-water tanks, which, of course, might take the form of steel-tubed wells, though his idea was that deep wells might involve unnecessary pumping. Where, however, the question of space cropped up, these deep wells might be utilised with great advantage. There could be little doubt that typhoid, as one speaker remarked, was a rural disease. It became epidemic in larger communities only after it had been nurtured and had broken out in rural districts. They had done much to combat its ravages in towns, and something had been done in rural districts, but much still remained to be done. If this question of rural water supply could be thoroughly ventilated it was one, he believed, that would ultimately give a valuable return. England was a small country with a rapidly growing population, and unless the sewage could be prevented from getting into the water supplies, there would soon come a point at which they would have to set to work to undo what they might, with an expenditure of much less money and energy, prevent.

MR. J. E. PURVIS (Cambridge), in reply, said that there were some questions raised in the discussion which he thought should be more fully discussed. One was with regard to the statement by Mr. Moor as to the organic

matter in water and its effect in lowering the state of health. He seemed to doubt that statement because he said it was stated in text-books. He (Mr. Purvis) suggested that statements in text-books were often true, and it did not follow that because the statement was in text-books it must be viewed with suspicion. The point to be remembered was that it was not only a statement in text-books, but it was a statement based on the authority of medical men. He would point out that although people did not drink the large volume of water suggested by Mr. Moor, it was the *continual* use of the water which caused the danger. And where they had an analysis showing dangerous contamination by organic matter and chlorides, the matter became particularly serious when the water was used by infants and invalids. If they supplied infants and invalids with such water they were giving them a very dangerous and polluted water, whatever the bacterial examination might show. And then with regard to standards, if they had tables which represented a thousand analyses, as suggested by Mr. Moor, somebody would want a table which represented two thousand analyses, and so on. Besides, it would be almost a physical impossibility to compare an analysis with a thousand analyses; it would take a week to do it. They were living in a work-a-day world, and they had to put up with compromises. They must take a single analysis and judge it on its own merits: what it was and what it might be, and also compare it bacterially. There was another point brought out by Dr. Kinnicutt, of Massachusetts, whom he was extremely glad to have heard. The publications issued by the Massachusetts Board of Health were not only ideals, but they also gave us methods. They taught many important methods; and the method implied the ideal. If in England use could be made of some of these methods and equally satisfactory results be obtained, the people would be considerably better off as regarded their public health. The particular point he (Dr. Kinnicutt) mentioned was with regard to the oxygen-absorbed test. That was also the point that the Chairman of the Cambridge County Council wished to be cleared up. Also Mr. Moor said that oxygen absorbed did not affect the lower forms of life. It was not suggested that it did. The oxygen-absorbed test scarcely applied to these lower forms. In the first place it was usually applied to nitrites and to ferrous iron primarily. Then it represented the amount of oxygen which was taken from the potassium permanganate and used to oxidise organic matter in solution to water and carbon dioxide; and the measure of it distinguished if the organic matter was in a stable or an unstable condition. Then again, with regard to Dr. Kinnicutt's question as to the Massachusetts Board of Health not laying so much stress upon it. He (Mr. Purvis) was very interested in that statement, because he had always taken the opposite view. He had always considered that the oxygen absorbed was a most important figure, and for the reason that it dealt with three points: first with nitrites, secondly with ferrous iron, and thirdly with the dissolved organic matter. As regarded the dissolved organic matter, if they had a high figure for that experiment, in two or three hours

at 80° F., what it usually meant to the chemist was that the organic matter (say such highly complex bodies as organic nitrogenous compounds) was in an unstable state, and that it was breaking down; whereas if they got a low figure, it meant they were dealing with organic matter which was more or less stable, and it might be of purely vegetable origin. That was the reason why they laid such stress upon the quantity of oxygen absorbed. Then with regard to a point brought forward by Mr. West Knights, and also by Mr. Martin, that it was not necessary for the analyst to know anything about the history of any water sent for analysis. He would go with them thus far: that if the instructions to the analyst were that he should simply state his results with no report, or at any rate with only a provisional judgment, he would agree; but if he had to give a judgment, and that judgment was to be of far-reaching importance, then he said the analyst should know the origin and the history of the particular water. He was very pleased to hear that Dr. Kinnicutt laid great stress upon the instructions for collecting samples of water; it was most important. He would give one example of carelessness in collecting water: he had a sample once sent to him for analysis contained in a bottle which had previously contained eau de Cologne!

SANITARY BUILDING CONSTRUCTION.

By ALFRED SAXON SNELL, F.R.I.B.A.

(Fellow.)

SANITARY Building Construction is a wide term, and it is difficult to define its limits. For the purpose of this article (which must be brief) I propose to take the narrowest interpretation.

Insanitary building construction may be generally described as that which is calculated to produce conditions in our buildings tending to lower the vitality or otherwise prejudicially affect the health of the occupants.

It is the aim of sanitary construction to prevent these conditions arising, and especially two of them, viz., dampness and stagnation of air. We must keep our buildings dry, and the air in them pure and sweet under all conditions.

There is, however, a third evil condition, which it is also of great importance to guard against, i.e., the use of materials which are themselves noxious or likely to hold and nurture the germs of disease. Many materials are not actually noxious, only potentially so; and their harmful activity is caused or fostered by the presence of damp and stagnant air.

These three conditions act and react one upon the other; and if, in building, we exclude them all, we have practical sanitary construction.

Sanitary building construction has advanced greatly within the last thirty years, but constant vigilance is still required to insure the exclusion from among the many new materials now available, of those which are harmful in the direction I refer to above. Moreover, I venture to think that the standard of excellence (from a sanitary point of view) of many of the materials and methods of construction now accepted as satisfactory requires to be raised.

In all building by-laws that standard is necessarily a *minimum* one, and in the majority of buildings it is seldom exceeded, if indeed it is attained. There is, I fear, little hope of this standard being raised until

the community recognizes the very great importance of thoroughness in sanitary precautions; and thoroughness may be inculcated gradually by the constant exposure of the futility of half measures.

There was a maxim much quoted by a past generation of builders, that a good building should be "sound tie, top and bottom," that is to say that it should have a sound foundation, a watertight roof, and its walls properly strengthened by the tie of the floor, and otherwise.

It is also a good commencement for sanitation; for instability of the framework of a building tends in time to set at nought the careful construction of sanitary fittings, and to admit damp into the buildings.

I do not propose to discuss the question of the site and the nature of the ground upon which a building should be erected. In this country, and especially in towns, choice of site is restricted. Other considerations than that of suitability from constructional and sanitary points of view are paramount.

We must be prepared to build sanitarily upon clay, gravel, sand, or chalk; anywhere between the top of the hill and the bottom of the adjoining valley; on dry ground; on wet ground; and at times on *bad* or polluted ground. In each case we must adapt our method of construction to suit the particular circumstances; but in all cases to secure a sound foundation and the exclusion of ground air from the building.

Under the usual by-laws a layer of concrete six inches thick (in some cases four inches) is required for the latter purpose, but in many cases, I venture to think, it is an inadequate protection. Water will run or rise from damp ground through cement concrete as through a sieve. It is well, therefore, to add a rendering of cement on the top of the concrete; better still, asphalte, which alone can be relied upon to exclude water.

The second safeguard, or so to speak "line of defence," against ground air is the open space beneath the ground floor, provided it is well ventilated. The sanitary value of an air-flushed space beneath the ground story is scarcely sufficiently recognized. In hospital buildings it is commonplace; why not in all buildings? It is not too much to say that the free passage of air beneath the building is of more value than a bed of concrete over the site.

Ventilation of this space is effected by air-bricks in the outer walls, properly distributed to ensure that no part is left stagnant. Generally too few are provided, and these are often closed up, in time, by successive coats of paint, or buried by the raising of garden beds next the building.

Moisture will also travel up, and through, the walls to a surprising

extent; hence the necessity of an effective damp-course. The commonest and cheapest form is that formed with slate set in cement. This, if the two courses are laid to "break joint," is effective enough, provided there is not the slightest settlement in the walls; otherwise a break occurs, forming a fissure which dampness can penetrate.

An excellent damp-course is also formed with glazed perforated slabs, and these serve also as means of ventilation under the floor. Sheet lead between two thicknesses of tarred felt should be effective, but care must be taken that the joints are very carefully lapped, and that the brickwork both above and below is even, so as to prevent perforation by excrescences on the bricks.

Almost the only really satisfactory damp-course is good asphalte, about half an inch thick, not more.

Assuming that the lowest floor is as little as twelve inches above the level of the ground outside, a damp-course placed over the whole thickness of the walls, etc., below the floor sleepers and a few inches above the ground is quite effective. But when, as is often the case, the lowest floor is below the level of the ground, obviously the simple damp-course is ineffective by itself. It is possible, of course, to keep the wall dry by turning the damp-course up the wall on the face to a few inches above the ground, but great care is required to ensure a proper junction at the angle of the vertical and horizontal layers.

Another method is the construction of a "dry area," which is usually formed by carrying a thin (half-brick) wall from the footings up to the ground level. In order to withstand the pressure of the earth outside, this wall must be provided with means of support from the main wall; either small bent iron ties or occasional brick ends bedded against the wall, and always with a small piece of slate placed between the brick and the wall. Obviously without the slate the porous brick end would convey dampness to the wall. It is a clumsy method, but quite effective if carefully done.

Various forms of iron ties are used, and all are designed to prevent water travelling above the surface towards the main wall. A very effective vitrified brick is also made for the purpose, and is built into both walls. It will bear more pressure than the iron ties, and is of course not liable to corrode away. The vitrification of the material renders it impermeable by water.

Neither the vertical damp-course, nor dry area, can be considered good sanitary construction. A wide *open* area is the only satisfactory solution; and this should be carried down at least a foot below the floor level.

Thus the whole surface of the walls of the rooms is exposed to the air. The part played by the porosity of walls in the ventilation of buildings is apt to be overlooked.

The best sanitary construction is to avoid basement or semi-basements altogether for living rooms.

So far we have dealt with dampness arising from the *ground*. Next in order is that arising from the rain beating on the surface of the walls. Damp walls are obviously insanitary, and here we are met by a difficulty. If a wall is constructed so non-porous as to exclude water, it may also exclude the passage of air. What is required is a construction which, as far as possible, shall attain to the ideal supposed to be the special property of certain much-advertised cloth materials for coats, which claim to be "rain" but not "air"-proof.

As a rule, and except in exposed positions, good brickwork is very satisfactory in this respect, and the ordinary London stock brickwork especially so.

The vertical surface of the bricks has a very thin skin, which acts as a slight check upon the entry of water, and the rain therefore runs more readily down the surface to the ground. The weak spots are the mortar joints and any horizontal surfaces. At the joints it is impossible to avoid small ledges being left either on the brick or mortar, and these at once collect the water and allow it time to penetrate the brickwork. The "cut and struck" weather joint counteracts this to some extent. In making this joint with the point of the trowel, the pressure used consolidates the surface of the mortar, thereby closing up the larger pores. The outward slope throws the wet forward from the face of the wall, and the sharp edge assists this action.

Another safeguard against damp in the wall is solidity of construction. A solidly built wall may hold water in the innumerable pores and small interstices of the bricks; and this may go right through the wall, but generally it travels so slowly as to be absorbed by evaporation before it has gone far. Voids in a wall, formed by lack of sufficient mortar in the joints, collect and convey water readily to the internal face.

In very exposed positions, and especially with a west and south-west aspect, brick walls 14 inches thick, or even more, are not rain-proof, and it then becomes necessary to protect them by special means. One of the most ordinary methods is that of building what are called "hollow walls." The outer wall forms in effect a "dry area." Inasmuch as the main wall cannot be reduced in thickness the method is not cheap, but it is certainly effective.

Another and more picturesque method is to tile the external face of the wall. The tiles would be secured by nails and bedded in cement or plaster, or merely hung on fillets nailed to the wall. I have also found that slates bedded in mortar and with a three-inch lap are absolutely effective. A rendering of cement or even painting with tar is of use.

With respect to materials of construction, obviously anything likely to nurture, or, under given circumstances, generate noxious gases or growths, must be considered as insanitary for use.

I have heard that ordinary road drift makes very strong mortar; and this is no doubt due to its main constituent, washed, *i.e.*, sharp sand. But in general it also contains particles of manure and decayed vegetable matter, which cannot but be injurious and a source of pollution to the air passing through a wall. Ordinary pit or other unwashed sand has been objected to on the ground that it contains various particles of organic matter; but with fairly clean sand the danger is a negligeable quantity. Mortar formed with finely ground coke breeze is, of course, entirely free from objection, and it is very strong.

We have next to consider the roof, and we are taught much about the sanitary value or otherwise of various roof coverings, but their qualities as effective shelters are on the whole the most important. In order that they may be able to successfully resist wind and rain, care must be taken that their construction is good and substantial, and the materials used sound and, above all, lasting.

The most common roof coverings used in this country are slates and pressed tiles.

Ordinary Welsh Slates make a most satisfactory roof. Their thinness and evenness require a comparatively light construction for support. They are practically impervious to rain, and can be laid at a comparatively low pitch. Laid in rows, lapping one over the other, they present throughout the surface of the roof a uniform thickness of three slates; and by "breaking joint" each course, the joints of the two lower thicknesses are covered, and thus no water can penetrate them.

Plain tiles are laid in a similar manner; they are heavier, and require therefore stronger construction of the roof for their support. They cannot, however, be laid so closely, and therefore a driving rain is more easily forced up between the layers. To counteract this they must be laid at a steeper pitch than is necessary with slates. Being of greater thickness and worse conductors of heat than slates, they are undoubtedly better for keeping out heat in summer and cold in winter; and where rooms are constructed within, or partly within, a roof, this is a matter of importance.

Boarding and felting beneath the slates or tiles give further protection. The felting used should be "inodorous" tarred felt. The ordinary plain, thick felt, although doubtless much warmer, is liable to harbour animal life; and some felt is anything but inodorous.

With respect to hips and ridges it is only necessary to bear in mind that, whether they are formed with slate, tile, or lead, they should be so fixed and set as to leave no openings for the penetration of water to the roof.

The same may be said of lead gutters and valleys; and it is necessary to see that they are laid to a regular fall to the outlet, that the upturned sides against the parapet walls are properly protected with flashings, that they are carried well under the slating, and finally that each length of lead is laid without transverse joints (which would very soon break open).

The only practical way of avoiding these joints is to form drips between each length, and care should be taken that the end of the upper length when turned down laps well over (but not too much) the end of the lower turned up.

Defective and inadequate eaves, gutters, and down pipes ("spouts") are very likely to divert water into a building, and are constant sources of soakage to the walls. Very often the gutter is so fixed that a heavy wash of water down the roof will shoot over the edge. This is not likely to happen if the gutter is large and fixed well up under the slating. It is usual to fix the gutter with a slight fall towards the outlets; but it is a good practice for keeping the joints sound to have them quite level; though obviously it is not good from a sanitary point of view.

Down-pipes should always be fixed well clear of the walls on "holder-bats" or bracket supports. Possible leakage does not involve damage to the walls, and the pipes can be painted regularly at the back. The pipe should be fitted at the bottom with a shoe, so as to direct the falling water away from the wall; or it will be sufficient if it discharges well within a curb round the gulley at the ground level.

So far we have considered the dampness which may come from without the building. There is that also which arises from within and is the result of condensation. In certain conditions of the atmosphere the air is heavily charged with water (and warmed air holds a much larger quantity in suspension than cold air), which is condensed or deposited in minute particles upon contact with cold surfaces. If therefore by the nature of its construction or materials the wall is cold, it acts as a condenser upon the air, and the sight of walls streaming with water is familiar to most people. We have then to avoid such materials or construction; or if, for

good reasons, we must employ the materials, care should be taken to counteract their effect by construction. Stone and concrete, and generally any material which is a bad conductor of heat, may be placed in the category, and it is generally necessary with these materials to line the inner surface of the walls with bricks.

Lack of porosity of the surface of the walls or plaster (such as may be caused by painted or varnished surfaces) may defeat the quality of brick-work in this respect, because a bar is set up to the passage of air through the wall from the outside; this air, colder than that on the inside, would otherwise take up the moisture as quickly as it was deposited.

The porosity of walls has also its place in the ventilation of our buildings. It is too large a subject to enter upon in this paper, and I must content myself with noting that absolutely impervious walls have been shown to deprive buildings of a large and necessary amount of ventilation.

Coming now to internal construction we are mainly concerned with the walls and floors.

Apart from decorative considerations, a plain brick surface to the walls well limewashed is quite sanitary—more so than many more costly finishings. The great drawback is the number of small surfaces and ledges left, which form lodgments, for the collection of dust, composed of small particles of organic or inorganic matter; and dust, it must always be borne in mind, is a carrier of disease germs. It is composed of very small particles of inorganic and organic matter, and under favourable conditions (especially with heat and moisture) the organic matter becomes putrescent.

A smooth surface without ledges is best obtained by various kinds of plaster. Whatever the setting material, whether lime, cement or gypsum, etc., the aggregate is generally sand, and if it is clean and sharp no sufficient objection can be taken to it; but in cheap building, inferior sand is, with a large admixture of clay and even vegetable matter, too often used, and it cannot be otherwise than insanitary.

Plaster may be painted or distempered; the latter for choice, because it offers less resistance to the passage of air through the walls, and it is cheaper to renew. Paints, especially enamels which are largely composed of varnish, allow of a smoother surface, and can be washed when necessary without detriment to the surface. For the walls of hospitals, distemper is generally considered bad because it is mixed with size; and size is animal matter which putrefies.

Papering (and that with rough or "flock" surfaces more particularly)

on a wall cannot be regarded as satisfactory from a sanitary standpoint. It is perhaps a counsel of perfection to suggest that it should never be used in ordinary rooms. For sick rooms and hospital wards it is absolutely unsuitable.

Moulded cornices and skirting boards also have many surfaces and internal angles, upon, and in which dust collects, and is removed with difficulty. It may be well to note here, that if skirting boards are used, care should be taken that the plaster work is carried down behind them to the floor level. Builders like to effect a little saving by omitting this precaution. In hospital buildings moulded skirtings are now replaced by a hollow curve between the walls and floor, which is easily cleansed. It is also usual to treat all the internal angles of walls, etc., in this way. It will be noticed, by the way, that internal square angles always appear a little cleaner than the adjoining surfaces: and this is because the air does not readily circulate therein, and it is therefore likely to be more or less stagnant.

Floor surfaces should also be as clean and smooth as possible; and the most sanitary kinds are those without joints, which are the most likely places for harbouring dust and dirt in the building.

Ordinary wood-framed floors, *i.e.*, those formed with wood joists carried from wall to wall, are usually covered with boarding of soft wood about an inch thick and from three to seven inches wide. Such boards laid together and wedged up close, present a very satisfactory surface for a few weeks or months; but sooner or later shrinkage opens the joints; these quickly let in the dust, and whenever the floor is washed dirty water and soap find their way in and fill them up. A tongued soft-wood floor is but little better. Hard-wood tongued floors shrink less; or, under favourable conditions, not at all. These conditions (the use of thoroughly seasoned wood and absolute dryness of the building), however, are seldom realized. In earlier times it was customary to build more slowly, and the carcase of a house was often left to dry for several months before the joinery was put in and fixed. Now-a-days a house is finished and occupied many months before the walls are really dry.

In all public buildings, and especially in hospitals, solid floors of various constructions are, or should be, used. The commonest and least costly is that formed with light concrete filled in between steel joists; the concrete being composed of coke breeze and hard broken brick mixed with Portland cement in proportion of six to one.

Lighter floors are formed with terra-cotta or other burnt clay beams

or tubes, supported at each end between the joists, and filled in on top with a thin layer of concrete.

Such floors can be covered with wood in the form of blocks or with tongued boards bedded on, or nailed to, the concrete, and thickly coated on the underside with a mastic, of which tar is a considerable ingredient. They can then be stopped in with bees' wax and turpentine, and polished; and a thoroughly sanitary floor is thereby obtained.

During the last few years thick linoleum has been used with success in place of boards or blocks, and it can be polished equally well. It can be made in six-feet widths and long lengths, and the joints are thus reduced to a minimum. It is, however, necessary to prepare the concrete floor with a thin layer of cement to an even, though not necessarily a smooth, face, and the fixing mastic is merely paste and glue.

The floors of bathrooms and w.c.'s are best formed with hard tiles or terrazzo. The latter is more absorbent than the former, but it can be, if necessary, polished in the same manner as a wood floor. Whilst referring to these rooms it may be noted that the walls should always be lined for a good height, say five or six feet, with glazed tiles.

Up till a few years ago internal partitions, when not of solid brick, were usually formed with wood framing, which was lathed on both sides to receive plaster. Latterly a number of light concrete and plaster slabs have been placed upon the market with which strong, thin, and *solid* partitions can be formed; and it is likely that the old-fashioned wood-framed partition will be superseded by this far more sanitary construction.

These few notes do not by any means exhaust the subject; but perhaps enough has been cited to draw attention to the main points to be borne in mind in seeking to secure good and sanitary building construction.

NOTES FROM THE REPORTS OF THE MEDICAL OFFICERS OF HEALTH.

THE DUBLIN POOR.

Extract from the Report of the Medical Officer of Health for Dublin, 1903, SIR CHARLES A. CAMERON, C.B., M.D., D.P.H.

There are probably no cities in the United Kingdom in which so large a proportion of the population belong to the poorest classes as is the case in Dublin. Of this great poverty of a large proportion of the population there are many proofs.

In 1903, 39·7 per cent. of the deaths—not merely in the city, but in the whole metropolis—took place in the workhouses, hospitals, lunatic asylums, and prisons. Out of a total of 9,047 deaths in that year, 1,618 occurred in the workhouses. In the 76 largest towns of England and Wales, 22·7 per cent. of the deaths took place in similar institutions.

In the City of Dublin, by the Census of 1901, there were 59,263 families or occupiers of distinct dwellings. Of these, 21,702, or 36·6 per cent., occupied each a single room. In Belfast, which has a larger population than Dublin (City), only 697 families or occupiers were located in single rooms.

Lancashire contains 4,405,409 persons, embracing 913,581 families, of whom 14,727 occupy each a single room.

Glasgow, which has a large poor population, has 24 per cent. of its families in one-room tenements.

Edinburgh has 14·2 per cent. of its families in one-room dwellings.

In the administrative County of London there is a population of 4,536,541. The rents are high in that city, even in its poorest quarters, yet only 14·7 per cent. of its families (including single persons occupying a room) are one-room tenants. A large proportion of these tenants are single persons ("occupiers"). The population of Dublin in 1901 was 290,638. Of these, 63,853 occupied single-room tenements.

In Dublin nearly two-fifths of the families occupy single rooms. Surely that is a proof of the poverty of a large proportion of the population.

In most cities the purlieus are in a limited number of districts, but in Dublin they are to be met with everywhere. The lanes at the rear of such fashionable

squares and streets as Merrion Square, Fitzwilliam Square, Stephen's Green, Upper Mount Street, and where once there were only mews, are now occupied to a large extent by the poorest classes. In the early part of the last century nearly everyone who occupied a large house kept a carriage or other vehicle. Hence, nearly all the houses in Dublin had stables and coach-houses attached to them. A large proportion of these places have now become converted into dwellings, or are occupied by cabmen, small dealers, etc.

The people who live in single rooms are placed under very insanitary conditions. Dr. Russell, Medical Officer of Health for Glasgow, many years ago showed that the death-rate of persons living in one or two-room tenements was 27·74 per 1,000, and their zymotic death-rate 4·78 per 1,000. In the case of persons residing in three or four-room tenements the general death-rate was 19·45, and the zymotic death-rate 2·46. In the tenants of five or more rooms the death-rate was only 11·23, and the zymotic death-rate 1·14 per 1,000.

It is the large proportion of the one and two-room tenements in Dublin which reacts so injuriously on the general death-rate of the whole population.

The death-rate of children under one year old is in Dublin about the same as the average rate for the 76 largest towns in England and Wales. The rate is much below that of many English towns, but, on the other hand, it is above that of London and other cities. It is the high mortality of the children of the poor which greatly raises the general rate. The families of the "independent, professional, and middle classes" numbered in 1901, 104,624 individuals. In 1903, 273 children under five years old died. The ratio of deaths to the above population was 2·5 per 1,000. The "hawkers, porters, labourers, etc.," classes numbered 95,885 persons. Of these classes 1,462 children under five years old died in 1903. The ratio of deaths to the population of these classes was 14·2 per 1,000.

The poverty of a large proportion of the population of Dublin is shown by the large number of persons who are obliged to resort to the pawnbroker—"the banker of the poor." No inconsiderable number of the poor get out of their beds, or substitutes for them, without knowing when they are to get their breakfast, for the simple reason that they have neither money nor credit. They must starve if they have got nothing which would be taken in pawn. But articles of very small value will be accepted by the pawnbroker, and some item or items of a slender wardrobe are exchanged for the price of one or more meals —so small a sum as sixpence may be obtained in this way. In general the sums advanced do not exceed 2s. When work is procured the articles are, as a rule, released from pawn.

The pawning of clothes and other articles is not peculiar to the very poor; it extends to many persons belonging to the artisans' and better classes. On Monday, or perhaps Tuesday, no money is left, and the best clothes are consigned to the pawnbroker. On the following Saturday, on the receipt of the

weekly wages, the clothes are redeemed. Every Saturday night the pawnbrokers' offices are crowded with persons, chiefly women, getting back the articles that had been pawned earlier in the same week.

Those who pawn their goods in hard times may never be able to redeem them, and in due time they are sold.

The number of articles pawned in Dublin is very large. From inquiries which I made some years ago I ascertained that in a single year 2,866,084 tickets were issued in the City of Dublin, and the loans to which they referred amounted to £547,453, or at the rate of £2 4s. per head of the population in the city in that year. By far the larger proportion of the borrowers belonged to the working classes.

Although it might appear that the pawnbrokers' business is a highly remunerative one, yet a millionaire among them is a *rara avis*. The unclaimed articles are sold by auction, and if any article realises a sum in excess of the amount of the loan and interest, it is paid to the person who pawned it. On the other hand, it very often happens that the article is sold for a much smaller sum than that lent upon it. In one instance a pawnbroker lost £200 in one year in this way. There are many heavy expenses and losses connected with the pawnbrokers' business, and they also pay a special tax.

It has been suggested that the Continental *Mont de Piété*, a benevolent institution which provides loans for the poor, might be a good substitute for the present system. It was tried in Ireland about fifty years ago, but proved a great failure; and some authorities maintain that the *Mont de Piété* is not more advantageous to the poor. It certainly does not give them as liberal advances on the security offered. The smallest sum advanced is three francs (2s. 6d.), whilst in Dublin the poor seldom offer articles worth more than from sixpence to two shillings.

The business of the pawnbroker is one of great antiquity, as may be seen in the story of Judah and Tamar in Genesis xxxviii. 18.

It is a fact that some families pawn their clothes regularly every week, thus living a few days in advance of their income. The ordinary money-lender may charge any amount of interest on his loans—60 per cent. is not uncommon; but the interest charged by the pawnbroker is limited by law to 5d. per £ per month for sums under £10. A month's interest may be charged though the article may be redeemed within a shorter period.

The general state of things is the following:—The artisan or labourer is out of employment, perhaps for a week or a few weeks. How is he and his family to live until he regains employment? He may not be able to get credit with the food purveyors, and if he does he will, as a rule, be charged more on credit than he would for ready money. To persons so situated the pawnbroker is often the only "friend in need," failing whose assistance the resource might be the workhouse.

EARNINGS OF THE POOR.

Many thousands of families have weekly incomes not exceeding 15s. In many instances the income is as low as 10s. and even less. Here is an example:—A family, man and wife, resides in Dame Court. His occupation is that of a tailor, but he can only earn 10s. a week. His rent is 2s. 6d., which leaves 7s. 6d. for food, fuel, light, clothes, bedding, etc. Their breakfast consists of dry bread and tea. They have only another meal, dinner and supper combined: it consists of dry bread and tea, and herrings, occasionally porridge. It may appear strange that a tradesman could only earn 10s. per week; but such is often the case owing to irregular employment and the poor payment for the making of the cheaper kind of clothes. Shoemakers frequently can only make from 15s. to 20s. a week, owing to the reduced price for hand-made shoes. The use of machinery in the manufacture of boots and shoes has greatly lessened the earning of the shoemakers who work in their own dwellings. There are 4,854 persons engaged in the boot and shoe and tailoring business; 2,087 of them are females, and the vast majority are working tailors and shoemakers. The great majority are living in very inferior dwellings, and they have a very poor diet. On the whole, they are better off than the labourers and vanmen.

The highest rate of wages for labourers is 20s. per week; a large proportion are paid from 15s. to 18s. a week. Even when they are sober and with small families they cannot enjoy much comfort on the higher rate of wages. When the labourer is of the inferior order, has precarious employment, earns at the most 15s. per week, and has a large family, it is easy to imagine their deplorable condition.

INDUSTRIAL OCCUPATIONS OF THE PEOPLE.

Dublin is not much of a manufacturing city. Its importance is due to being the centre of the Local Government of Ireland, the seat of the Superior Courts of Law, the headquarters of the Medical Profession, and the Banking and Insurance business, the seat of two Universities, and its large business as a port. There is comparatively less work for females in it than is the case of English towns. In 1901 there were 92,956 women, twenty years of age and upwards in the City of Dublin. Of these 56,827 were not following any remunerative occupation. On the other hand, there were 82,756 males, twenty years old and upwards, of whom 6,938 had no occupation. The large proportion of unemployed women is attended with one satisfactory result—namely, that infants are generally suckled by their mothers, instead of being bottle-fed, as is so generally the case in the English, Scotch, and Welsh manufacturing towns. In 1903 the deaths of infants under one year of age in Dublin was 153 per 1,000 registered births; in Manchester the death-rate was 169; in Birmingham, 159; in Stockport, 185; in Burnley, 217; in Hanley, 173; in Leicester, 160; in Bootle, 115; in Aston Manor, 161; in Grimsby, 167; in Wigan, 180; in Bury, 165; and in Salford, 167.

The disadvantage of want of employment for women is the smaller average

earnings of families, with consequent lower standard of diet, lodging, and clothing.

THE DWELLINGS OF THE POOR.

Although a large number of dwellings for the working classes have within the last thirty years been erected by the Corporation, the Dublin Artisans' Dwellings Company, the City and Suburban Artisans' Dwellings Company, the Housing of the Poor Company, the Industrial Tenement Company, and by railway companies and private firms and persons (notably Lord Iveagh's and the "Guinness Trust" Dwellings), the great majority of the lower classes are still unprovided with proper dwellings. The greater proportion of the tenement houses were originally built for the accommodation of one family, and many of them are now occupied by from six to twelve families. The slow growth of the population of Dublin is chiefly the cause of the large number of families per house. The migration of a large proportion of the well-to-do residents from the city to the suburbs left a large number of houses vacant, which, failing to be let to a corresponding class, became ultimately converted into tenement houses. If, as in nearly all large towns in England, the industrial population had steadily increased, the vacated houses of the middle and upper classes would be quite insufficient to provide dwellings for the working classes. New houses would have to be built for them. In 1831 the population of Dublin was 203,650; that of Belfast was 60,813. In 1903 the population of Dublin was 293,385; that of Belfast was 358,680. In 1841 the population of Dublin was 222,726, inhabiting 20,109 houses; in the same year the population of Belfast was 75,308, occupying 10,906 houses. In 1901 the population of Dublin was 290,638, and the number of inhabited houses 32,061, giving an average of 8·6 persons, or nearly two families per house. In Belfast in 1901 the population was 349,149, inhabiting 67,108 houses, nearly every family possessing a separate house. The great age of the majority of the tenement houses renders them liable to constant repairs, and many of them are so decayed that nothing short of re-building them would be a real remedy.

In 1903 the registered tenement houses numbered 6,195, and in them more than a third of the population of Dublin resided. About one-third of these houses had at one time or another been de-tenanted and closed as unfit for human occupation, but had been repaired and re-opened. About 1,000 similar houses which had been closed are now in ruins or have completely vanished, leaving only their sites. All through the city these ruins and vacant sites can be seen. At the present moment there are at least 20,000 persons whose dwellings urgently require to be radically improved.

Some years ago I ascertained certain statistics in reference to a large number of tenement houses in various streets.

Dr. Cameron gives in detail the results of one street, and summarises these results as follows:—

Summary.

Number of Tenement Houses in Street.	Number of Rooms in Street.	Number of Families in Street.	Average Number of Rooms per Family.	Total Weekly Rent of Street.	Average Rent per Family per Week.	Total Yearly Rent of Street.	Total Valuation of Street.
74	532	370	1·43	£ s. d. 46 17 1	£ s. d. 0 2 6·39	£ s. d. 2,365 6 0	£ s. d. 857 10 0
						Average Yearly Rent per House.	**Average Valuation per House.**
						£ s. d. 31 19 3·24	£ s. d. 11 11 9·08

CLOTHING AND BEDDING.

Amongst the labouring population the children are worst off for proper clothing. They rarely get new articles to wear, and frequently are clothed in the worn-out garments of their parents, the garments not infrequently being ill-adjusted to the size of their new wearers. Thousands of children go with naked feet even in winter. The want of warm clothing in winter often lays the foundation of future delicacy of their constitution, and renders them less liable to resist the attacks of disease. The want of good food and warm clothing often causes the fatal sequelæ to attacks of measles. Amongst the rich this disease is rarely fatal; but the children of the poor offer up many victims to it —not so much during the attack, but in bronchial and other affections which supervene as consequences of neglect and of insufficient clothing and nourishment. A most useful Society—the Police-Aided Society—for providing clothes for destitute children performs good work in Dublin, and deserves more support than it receives from the public.

A humorist once said that half the population of Dublin were clothed in the cast-off clothes of the other half. This is substantially true. In Patrick Street every day a sale is carried on in the roadway of all kinds of old clothes, boots, and domestic utensils. At this daily sale even bundles of wall-paper are invariably to be seen. As many as 300 persons are often engaged in selling, inspecting, or purchasing the variety of articles displayed in this "rag-fair." Some of the goods displayed one would think hardly worth picking up as a derelict. Veritable rags are offered for sale. Lord Iveagh has acquired extensive premises in Francis Street, in which he proposes the vendors of second-hand clothes should locate themselves. All the articles to be disposed of in this place will be disinfected. This will be an excellent sanitary precaution, for there can be no question as to the spread of infectious diseases through the

m of second-hand clothes. During the recent smallpox epidemic in Dublin ases of the disease were contracted by pawnbrokers' assistants who had ed infected clothes pawned in their offices.

ie state of the bed-clothes is often very filthy. The blankets are rarely d, and there are instances in which they never were placed in a wash-tub ; the whole time they were in use.

iere are four lady Sub-Sanitary Officers in Dublin, and their principal duty advise the women of the tenement houses to keep themselves, their en, their clothes, their bedding, and their rooms clean. They have ded in many cases in effecting great improvements in the domestic hygiene tenements.

is not, however, invariably the case that the tenements are not kept ently clean. Now and then one meets with really tidy persons in clean, ept rooms.

THE DIET OF THE LABOURING CLASSES.

ie diet of the labourers, hawkers, and persons of the same social position erally a very poor, and not seldom a very insufficient, one. The constant are bread and tea. Butter is not always obtainable. Cocoa is pretty used: coffee, never. Very little home-made bread is used. The bakers' is of good quality, for even the very poor will not purchase inferior bread. al porridge is occasionally used, but not so generally as it ought to be.

dian corn, formerly much employed in the dietary of the poor, now rarely into their *cuisine*.

ef and mutton are not often found on the tables of the poor. When they is generally for the use of the bread-winner of the family. They are or boiled, for there is no way of roasting them. Pork is not much in d, except in the form of "crubeens," or feet of the pig. Bacon is largely n the form of rashers, but more frequently it is boiled with cabbage. The r American kind is, owing to its cheapness (5d. or 6d. per lb.), mostly in

ddings, pies, and tarts are practically unknown. There are no ovens to them in, nor, as a rule, any knowledge of how they should be made. In ew of the primary schools for girls is cooking taught.

regards vegetables, few kinds, except potatoes and cabbage, are used. ind beans are rarely seen on the table of a labourer's family.

ie milk most frequently used is condensed skim milk, which is purchased to 3d. per tin. There is no fat (the most valuable constituent of milk) in ted milk, and it is, of course, quite unsuitable for infants. The proportion ndensed whole milk to condensed separated milk is very small. The n have been cautioned not to feed infants with separated milk, and I think rarely use it for that purpose, though cases to the contrary have come

under my observation. Owing to the scarcity of employment for women, the vast majority of them remain at home, and can, therefore, unlike factory women, nurse their children. The proportion of bottle-fed to "nursed" children is not large in Dublin, and greatly accounts for the comparatively low infantile mortality in a city where the adult death-rate is so high.

Milk is much used in the diet of children of all ages, and it is largely the condensed separated milk which the elder children use. This article, of course, is very inferior to the condensed whole milk, and although the former costs much less, the whole milk is the proper kind for children. With the view of ascertaining the quality of the ordinary whole milk in actual use in the families of labourers, forty-eight specimens were collected and analysed. Twenty-four were found to be up to or above the average quality (12·5 per cent. of total solids, including 3 per cent. of fats); seven were up to the legal standard (11·2 per cent. of total solids, including 3 per cent. of fats), and the remaining sixteen were below the legal standard. Of the latter, however, only four were so far below the standard as to warrant a prosecution if they had been taken up in the proper manner by Inspectors of Food.

These results are not so bad as might have been anticipated, for the average quality of the whole forty-eight specimens was up to the legal standard. Still, it would be far more satisfactory had it been up to the standard of average quality (9 per cent. of non-fatty solids and 3·5 per cent. of fats).

The quality of the milk supplied to Dublin is certainly greatly superior to what it was before the provisions of the Act relating to food adulteration were put into force.

The use of separated milk is unobjectionable in a diet into which an abundance of fats enters; but as bread, which contains almost no fatty matter, is the staple food of a large proportion of the population, separated milk in their case still further accentuates the absence of the fats. I have frequently pointed out that it is the fats which are most frequently the deficient constituent of the food of the poor. In the animal economy carbo-hydrates (starch and sugar) are converted into fats, but the transformation involves a greater physiological effort than is necessary when the fats of vegetable and animal food supplies the fat required by man. Bread is an excellent food only when supplemented with butter or other fatty matter; but bread and separated milk do not supply in full the requirements of the body. I have no doubt that diets greatly deficient in fats render people more susceptible to the attacks of various diseases, especially of tuberculosis. In cases of consumption the use of certain forms of fats is known to be beneficial; and in the case of persons yet in health a liberal supply of fats is likely to be, to some extent at least, a preventative against certain diseases.

Not much fruit appears on the tables of the poor. Oranges and apples are

sometimes given as a treat to their children. They also get inferior kinds of sweetmeat. Amongst the very poor fruit and sweets are practically unknown.

As is well known, there is a large consumption of whisky and porter amongst the labouring classes. In many instances an undue proportion of their earnings is spent on these beverages, with consequent deprivation of home comforts and even necessaries.

The workman is blamed for visiting the public-house, but it is to him what the club is to the rich man. His home is rarely a comfortable one, and in winter the bright light, the warm fire, and the gaiety of the public-house are attractions which he finds it difficult to resist. If he spends a reasonable proportion of his earnings in the public-house is he more to be condemned than the prosperous shopkeeper or professional man who drinks expensive wines at the club or the restaurant, spends hours playing billiards or cards, and amuses himself in other expensive ways? At the same time, it cannot be denied that there is too much intemperance amongst the working classes, and that the women, who formerly were rarely seen intoxicated, are now frequently to be observed in that state. The publicans themselves are averse to drunkards. Their best customers are the men who spend a moderate proportion of their wages in drink, for the drunkards lose their situations, or, if tradesmen, neglect their work, and reduce their incomes.

Infants are frequently fed on improper food—"a bit of everything" used by the family. In some cases they do not get sufficient milk. It is not unusual to see a mother giving a "sup" of the porter supplied to her in the public-house to her infant.

OBITUARY.

JAMES MANSERGH, M.Inst.C.E., F.R.S.

(Fellow).

The engineering profession generally, and the branch relating to sanitary science particularly, has sustained a severe loss in the death of Mr. James Mansergh, as it can be said without fear of contradiction that, during the later years of his life, he occupied the first and most prominent position in the engineering world, as far as matters of drainage and water supply are concerned.

Mr. Mansergh was born in 1834 at Lancaster, and at an early age became a pupil with Messrs. McKie and Lawson, civil engineers.

After having served his pupilage he became an engineering assistant to a firm of contractors, and was placed in charge of a very considerable length of new railway in Brazil.

After the completion of this work Mr. Mansergh returned to England, and became a partner with his late chief, Mr. McKie, and on the termination of the partnership, Mr. Mansergh undertook the construction of several works as a contractor, but he eventually joined his brother-in-law, Mr. Lawson, in partnership, and devoted himself entirely to the design and supervision of works, leaving the construction of the same in other hands.

It would be impossible within the limits of an Obituary notice to describe in detail the whole of the important works with which Mr. Mansergh was connected in this country, in the colonies, and abroad. It may safely be said, however, that there was scarcely any important scheme for drainage or water supply to cities in this country brought before Parliament upon which the opinion of Mr. Mansergh was not sought; and when it is mentioned that his professional duties took him to the United States in 1884, to Victoria (Australia) in 1889, to Canada in 1895, and to Ceylon in 1896, the magnitude of the work undertaken by him will be appreciated.

The two great works, however, with which Mr. Mansergh's name will be connected, and which will remain as monuments to his skill and ability,

ıre the main drainage scheme for the City of Melbourne, and the Birmingham water scheme.

The main drainage scheme of Melbourne is probably the largest, in ›oint of area, in the globe, embracing as it does 130 square miles of ;erritory.

The Birmingham water scheme is almost the largest in this country, ınd when complete will have involved an expenditure of about ten nillions sterling.

His Majesty the King honoured the City of Birmingham by opening hese works in the year 1904, and Mr. Mansergh was presented to the Ⲕing and assisted him in turning on the water from the Elan Valley Ɽeservoirs.

This was almost the last public appearance of Mr. Mansergh, as it was hortly after this that illness overtook him, which proved fatal on the 5th June, 1905.

Mr. Mansergh took great interest in, and acted as Chairman of, the ƷEeneral Engineering Standards Committee, and it was largely owing to his fforts that standards have now been adopted for many engineering applinces and products to the great advantage of the country generally.

Mr. Mansergh was connected with many Engineering and Scientific Societies.

He was elected a Fellow of the Royal Society on account of his ttainments.

He was elected an Associate of the Institution of Civil Engineers in 859, was transferred to a Member in 1873, became a Member of the Council in 1884, Vice-President in 1895, and was elected President in 900.

He was also a Member of the Council of Mechanical Engineers.

Mr. Mansergh took a great interest in The Royal Sanitary Institute, eing elected a Member in 1878, and a Fellow in 1888, and he also served or some years on the Council.

G. M. T.

NOTES ON LEGISLATION AND LAW CASES.

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BURIAL—*Burial Ground—Addition to—Land set apart for Interments in Breach of Order in Council—Disused Burial Ground—Power to Build on—Burial Act, 1853 (16 & 17 Vict., c. 134), ss. 1, 5, 6; Metropolitan Open Spaces Act, 1881 (44 & 45 Vict., c. 34), s. 1; Disused Burial Grounds Act, 1884 (47 & 48 Vict., c. 72), s. 3; Open Spaces Act, 1887 (50 & 51 Vict, c. 32), s. 4, and Schedule.*

The provisions of ss. 1 and 6 of the Burial Act, 1853, apply to an addition to an existing burial ground as well as to an altogether new burial ground.

Where a piece of land was set apart for the purposes of interment, and part of it was used for those purposes, in contravention of an Order in Council made under s. 1 of the Burial Act, 1853:—

Held, that the definition of a "burial ground," in s. 4 of the Open Spaces Act, 1887, which is by that Act rendered applicable to the Disused Burial Grounds Act, 1884, included land which had been "set apart for the purposes of interment," even though it was so set apart in contravention of the Order in Council, and consequently could never have been lawfully used for the purpose of interment; and therefore that s. 3 of the last-mentioned Act prohibited the use of any part of the land so set apart for building purposes.

Judgments of Wright, J., and Bray, J. (1905), 1 K.B. 403 affirmed.

In re BOSWORTH and GRAVESEND CORPORATION.

LIGHT AND AIR—*Ancient Lights—Substantial Obstruction—Nuisance—Injunction—Damages—Form of Order.*

In considering whether an obstruction to ancient lights amounts to an actionable nuisance, the test is not whether so much light has been taken as materially to lessen the enjoyment and use of the house that its owner previously had, but whether so much is left as is enough for the comfortable use and enjoyment of the house according to the ordinary requirements of mankind.

This principle, as laid down by the House of Lords in Colls *v.* Home and Colonial Stores (1904), A.C. 179, accords with the ruling laid down in Back *v.* Stacey (1826), 2 C. & P. 465; 31 R.R. 679; and Parker *v.* Smith (1832), 5 C. & P. 438; 38 R.R. 828. There is nothing in Colls *v.* Home and Colonial Stores that overrules Shelfer *v.* City of London Electric Lighting Co. (1895), 1 Ch. 287, 310.

HIGGINS *v.* BETTS.

ASTOR, LENOX AND
TILDEN FOUNDATIONS.

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THE ADMINISTRATION OF THE FOOD AND DRUGS ACTS: A REVIEW.

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(FELLOW.)

PART I.

SINCE the passing of the various Acts controlling the sale of food and drugs, so varied have been the positions taken by those entrusted with the defence in prosecutions, that a review of the existing powers, and some of the more recent decisions, may be of some utility and assistance to those entrusted with the administration of the various legislative measures controlling this subject.

The law relating to the adulteration of food is contained in the following enactments:—

THE SALE OF FOOD AND DRUGS ACT, 1875.
THE SALE OF FOOD AND DRUGS AMENDMENT ACT, 1879.
THE MARGARINE ACT, 1887.
THE SALE OF FOOD AND DRUGS ACT, 1899.

The principal Act is the Sale of Food and Drugs Act, 1875. The amending Act of 1879, the Margarine Act of 1887, and the Act of 1899 are supplementary enactments varying the powers by additions or amendments, which experience showed the 1875 Act required.

Other enactments relating to adulteration, and enforced by the Commissioners of Inland Revenue, are as follows:

THE ADULTERATION OF COFFEE ACT, 1718. Section 23 provides a penalty of £20 against "divers evil-disposed persons who at the time or soon after the roasting of coffee, make use of water, grease, butter, or such like material wherein the same is made unwholesome and greatly increased

in weight, to the prejudice of His Majesty's Revenue, the health of his subjects, and to the loss of all honest and fair dealers."

THE ADULTERATION OF TEA AND COFFEE ACT, 1724, provides a penalty of £100, and forfeit, for counterfeiting or adulterating tea.

THE ADULTERATION OF TEA ACT, 1730, provides a penalty of £10 for every pound of sophisticated tea found in possession or sold.

THE ADULTERATION OF TEA ACT, 1776.

THE CUSTOMS AND INLAND REVENUE ACT, 1882, relates to imitations of coffee, and coffee mixtures.

THE ADULTERATION OF HOPS ACT, 1733, relates to the sophistication of beer.

DEFINITIONS.

FOOD.—Section 2 of the 1875 Act gives the following interpretation: "The term 'food' shall include every article used for food or drink by man, other than drugs or water."

In a decision of the High Court in 1894 it was held that articles used in the preparation or flavouring of food, *but not themselves* used as articles of food, did not come within the scope of the definition.

As a result of this decision the definition was amended by section 26 of the 1899 Act as follows: "The expression '*food*' shall include every article used for food or drink by man, other than *drugs* or *water*, and any article which ordinarily enters into or is used in the composition or preparation of human food; and shall also include flavouring matters and condiments."

DRUG.—The term "drug" includes medicine for internal or external use.

BUTTER.—The word "butter" shall mean the substance usually known as butter made exclusively from milk or cream or both. (Margarine Act, 1887.)

MARGARINE.—The word "margarine" shall mean all substances, whether compound or otherwise, prepared in imitation of butter, and whether mixed with butter or not. No such substance shall lawfully be sold except under the name of margarine, and under the conditions set out in the Margarine Act.

CHEESE.—The expression "cheese" means the substance usually known as cheese, containing no fat derived otherwise than from milk. (Food and Drug Act, 1899.)

MARGARINE CHEESE means any substance, compound or otherwise, which is prepared in imitation of cheese and which contains fat not derived from milk. (Food and Drugs Act, 1899.)

The administration of the Acts is entrusted to the local authorities and their duly appointed officers, but with regard to imported articles the Commissioners of Customs are the administrators.

APPOINTMENT OF OFFICER BY LOCAL AUTHORITY.—Section 13 of the 1875 Act empowers local authorities to appoint any medical officer of health, inspector of nuisances, inspector of weights and measures, inspector of markets, or any police constable, to procure samples under the direction of and at the cost of the local authority. Such officer shall submit the same to be analysed by the public analyst of the district, who shall give to the officer a certificate specifying the result of his analysis. When purchasing samples the officer should carry with him written evidence of his appointment and authority to so purchase.

It is not intended to give in this article merely a *précis* of the various enactments relating to adulteration, but to present some observations on their administration, which, if perhaps not so interesting to older officers, may be useful to those with less experience, and students. There is one cardinal rule to be followed in order to avoid trouble and failure. An officer must always act fairly, and observe absolutely and in every detail the formalities of the various Acts.

PURCHASE OF SAMPLES.—Section 13 of the Act of 1875 specifies the officers who may be authorised to obtain samples. *The officers must be under the direction of the local authority.* A defence was set up in relation to this point in Hale *v.* Cole (55 J.P. 376). An officer purchased a sample of gin, but did not prove that he was acting under the direction of the local authority, and the Magistrate dismissed the case. The High Court held that it was not necessary to prove as a condition *precedent* that he was directed by the local authority by whom he was appointed. It has also been held that where an inspector has once been appointed, he may take any proceedings at his own discretion and without any *special* authorisation from the local authority. (Connor *v.* Butler, 2 J.R. 569). A similar difficulty can always be avoided by the local authority at their first meeting in each session directing the inspector to take samples, although this course is not absolutely necessary. It is also desirable, from an administrative point of view, that the local authority should order proceedings when required.

PURCHASE BY DEPUTY.—The local authority cannot appoint any person other than those specified in Section 13 of the 1875 Act to purchase samples, but the inspector can employ an agent or deputy to make the purchase. This was established by the cases Horder *v.* Scot, 44 J.P. 520 and 795, and Smith *v.* Stave, 45 J.P. 141. When a deputy is employed to make the purchase, and before he has left the premises, the authorised officer should enter immediately and state that the article was purchased for him, and he must comply with the prescribed formalities.

COMPULSORY ANALYSIS.—If after the purchase the vendor admits that the article is adulterated the sample *must* still be submitted to the public analyst, and the usual formalities strictly adhered to, in every respect as though no such admission had been made.

DUTY OF INSPECTOR AFTER PURCHASE.—On the completion of the purchase, *i.e.*, when the article demanded has been handed to the inspector and the money has been given in payment, the inspector must inform the person selling that he has purchased the sample at the *cost of the local authority*, and that it is his intention to have the same *analysed* by the *public analyst.* He shall then divide the article, as equally as possible, into three parts, each of which he must fasten up, mark, and seal in such a manner as its nature permits. He shall then deliver one part to the seller or his agent, retain one part, and submit the other part to the public analyst. The provisions of section 14 of the 1875 Act must be strictly complied with when purchasing samples. In notifying the seller, on the completion of the purchase, that it is intended to submit the sample for the purpose of analysis to the Public Analyst, the inspector should as a matter of practice use the exact words of the section, although Justice Cave held that no particular form of wording is required. It is essential, however, that the seller should know that the sample is taken for the purpose of analysis, in order that he may see that the samples are fairly taken. (Whecker *v.* Webb, 51 J.P. 661.) The notification, after the completion of the purchase, of intention to submit sample to the public analyst must be given "*forthwith.*" In Parsons *v.* Birmingham Dairy Co. (46 J.P. 727) it was held that notification two days after the delivery of the sample was not notification "forthwith." Justice Field stated "the intention of the Act was to strike a moment of time at which the seller parts with the article." In the case of Somerset *v.* Miller (54 J.P. 614) an inspector sent a deputy into an inn to buy a bottle of gin. Having made the purchase the deputy came out, and two minutes later both men entered the inn and informed the seller that the gin had been purchased

for analysis, and then proceeded to divide the article, etc. On analysis the gin proved to be thirty-seven degrees under proof. The justices dismissed the case upon the ground that the object of the purchase had not been declared "forthwith." The High Court held that the justices were wrong, and that the requirements of the section had been complied with.

DIVISION OF THE SAMPLE INTO THREE PARTS.—The division must be made from one undivided sample. In Mason *v.* Cowdary (64 J.P. 662) an inspector purchased six bottles of camphorated oil. He put them up in three lots (two bottles in each lot), sealed them, and gave one to the seller, retained one himself, and sent the third to the public analyst. The High Court held that he had not complied with the section. The six bottles should have been opened and the contents *mixed* together, and then divided. In the event of a prosecution the sample retained by the inspector for future comparison must be produced at the hearing of the summons. Inability to do this may be fatal to a conviction. (Section 21, 1875 Act.)

SENDING SAMPLES TO ANALYST.—As a matter of routine practice the officer should personally deliver the sample to the public analyst *without delay.* Where, however, the analyst resides at a distance of two miles or more the officer *may* send it by registered parcel post or other means of conveyance. Registered parcel post has the advantage of affording proof of the transmission. The regulations of the Postmaster-General must be observed when sending samples.

REFUSAL TO SELL ANY ARTICLE TO OFFICER.—While the penalty for selling an adulterated article is a sum not exceeding £20, that for refusal to sell is a sum not exceeding £10. (Section 17, 1875 Act.) Inspectors should carefully consider the details of this section. Cases of refusal more often occur amongst itinerant vendors, who adopt various methods to baffle an officer. The demand to be supplied with an article of food or any drug must be carried out in accordance with the section, otherwise a prosecution for refusal will fail.

The first point is that the offer to purchase must be made by an officer, and not by a private individual. The article *must* be exposed for sale, or on sale by retail. The officer *must* tender the price for the quantity demanded. The amount demanded must be a reasonable quantity. If a refusal is given the officer should inform the vendor that he (the officer) is

duly appointed to act, and if required by the seller he must show his written authority. The omission of these details would prove fatal to a summons issued for refusal to sell.

DEMAND FOR SUPPLY FROM A PARTICULAR RECEPTACLE.—In the case of Payne *v.* Hack (58 J.P., 165) an inspector had been supplied with rum from a particular bottle. After tasting it the inspector asked for half a pint, which the publican proceeded to supply from another vessel. The inspector then demanded the rum from the bottle from which he was first supplied, informing the publican that he was an inspector, and that he required it for analysis. The publican refused to sell and was prosecuted and convicted. This conviction was confirmed by the High Court, Mr. Justice Bruce saying, "The inspector demanded to be supplied with a sample taken out of the same bottle. I think he was entitled to this; for, if he were not so, nothing would be easier than for the seller to keep two vessels and supply the purchasers from one when the article was intended for consumption, and supply out of the other when the article was intended for analysis. Without, therefore, going so far as to say that an inspector is entitled to go into a shop and demand to have a sample out of any vessel he likes, *I think that, as he had already been supplied out of a particular bottle*, he was entitled to have the sample taken from that bottle."

Another useful example is to be found in Farley *v.* Higginbotham (42 Sol. J., 309). A policeman, instructed by an inspector, demanded from the servant of a grocer some coffee, and was supplied. The inspector entered and explained that the article was purchased by the policeman for him, and gave the required notice of the reason of purchase and his intention to submit it to the public analyst. The servant seized the coffee and threw it on the floor. The policeman asked for some more coffee out of the same tin, but the shopkeeper refused to supply it, saying that the servant had instructions to sell that coffee as a mixture only. The High Court held that there had been a refusal to sell, and that the shopkeeper was liable for the act of his servant.

These two cases are most interesting, more especially the remarks of Mr. Justice Bruce in the rum case in regard to the possibility of keeping two vessels. He struck the key-note of the difficulty inspectors frequently meet with in taking milk samples. It is well known that separate cans are kept, and the doubtful customer supplied with a special article by the more unscrupulous vendors. If the inspector demands a sample from another can he will probably be informed that it is empty, or that it is not

for sale, or that it is skimmed milk, the declaration *before* purchase being sufficient to protect the vendor.

In another case the inspector demanded a pint of milk from a milkman in the street, who immediately emptied the contents of his can into the gutter. A summons for refusal to sell resulted in a conviction. It is very desirable that power should be given to inspectors to demand to be served from *any* vessel containing milk.

TAKING SAMPLES AT PLACE OF DELIVERY.—Section 3 of the Act of 1879 empowers officers to procure at the *place of delivery* any sample of milk in the course of delivery *in pursuance of any contract.* Under section 4 *the seller or consignor* or any persons entrusted by him for the time being with the charge of such milk refusing to allow an inspector to take samples of such milk is liable to a penalty of £10.

These provisions are most important. By section 14 of the 1899 Act the power has been extended to taking samples of every other article of food as well as milk in course of delivery, but in these additional powers there is a proviso that every article taken under the above section must be at the *request* or with the *consent* of the purchaser or consignee. Samples of milk taken at the place of delivery do not require this consent. It is questionable if samples taken at the place of delivery can be taken by deputy, therefore the appointed officer should take them. An inspector has no power to take samples at any place outside his district. A farmer supplied milk to a dairy in Westminster, and the place of delivery was at St. Pancras Station. An inspector for Westminster took a sample and submitted it to the Public Analyst for Westminster. It was reported to have 21 per cent. of added water, but the High Court held that the inspector had no power to take samples in any place outside his district.

If the article sampled at the place of delivery is either milk, margarine, or margarine cheese, the sample must be divided into three parts, properly sealed, etc., and one part forwarded to the consignor, if his name and address appears upon the can or package containing the sample. It must be remembered that a *contract* must exist between the *consignor* and *consignee* when samples are taken at the place of delivery. These samples are usually taken at railway stations within the district of the inspector, or at public institutions having contracts.

In a case in which a milkman was hawking milk from door to door, as he was pouring some milk into a customer's jug, an inspector appeared and demanded a sample, which was refused. It was held that the milk was being delivered in *pursuance of a contract*, and the milkman was rightly

convicted for refusing to *give* milk for analysis. It should be remembered that the inspector does not pay for samples taken at the place of delivery, and that proceedings for adulteration must be taken against the seller or consignor, and not against his servant or agent.

SEPARATE OFFENCES.—Samples of milk were taken by an inspector at the place of delivery (a fever hospital) from three separate churns. Two of the samples were returned as adulterated, and one as genuine. Two summonses were taken against the consignor. It was argued that the contract was to supply the hospital with a certain quantity of genuine milk, and for convenience it was delivered in three churns, and that if the contents of the three churns had been mixed the sample would have complied with the standard, and the consignor would have carried out the conditions of his contract. The magistrates agreed and dismissed the summons, and no appeal was made by the local authority.

In the case of Fecitt *v.* Walsh (55 J.P., 728), an inspector had procured a sample of milk from *each* of five cans in the course of delivery. Two of the samples were adulterated, and two separate informations were laid. The High Court held that the procuring of each sample was a separate transaction, that the informations were properly laid, and that there could be two convictions.

COLLECTION OF SAMPLES.—The purchase of samples should, as far as possible, be made in a manner similar to that adopted by a private purchaser. Food inspectors are soon recognised, and it is advisable to employ an agent, who should, on the *completion* of the purchase, wait at the shop entrance for the officer to receive the purchase. The inspector should then return to the vendor, with his assistant, and inform him that the purchase was made for him *at the cost of the local authority*, and that it is his intention to submit the same to the *public analyst.* He should then proceed to divide the sample into *three equal parts.*

QUANTITY AT ONE PURCHASE.—If unusual quantities are purchased suspicion is usually raised. It is impossible to give a complete list, but the following will serve as a guide:—

Milk, one pint; butter, lard, margarine, coffee, cocoa, sugar, not less than half a pound; spirits and wines, one pint; oils, half a pint; bread, half-quartern loaf; drugs, tinctures, camphorated oil, spirits, six ounces; lime water, one pint.

Care must be taken to select best English-made bottles, especially for

nilk samples. The best form is an eight-ounce *Winchester-shaped* strong lint moulded bottle. With regard to milk, the bottles should be nearly ull, otherwise if samples are sent by rail the fat may be churned into umps. These bottles will also be useful for other fluid samples. *New lean* bottles and new corks only should be used.

On completing the division of the sample each bottle must be carefully orked and sealed, and a label affixed showing the number of the sample, he name of the inspector, the nature of the article, and the date of ollection.

For the collection of butter wide-mouthed honey jars fitted with ork-lined metal screw caps are most suitable. All forms of paper must e avoided, as they absorb the moisture from the butter. The samples hould then be placed in stout paper bags, and properly sealed and labelled rith the particulars before mentioned. The honey jars will be found to e equally useful to collect samples of various other foods, such as mar- arine, lard, coffee, sugar, etc.

Great care must be taken to avoid the possible chance of mixing amples, and when a large number of samples are to be taken a good plan s to place on each set of three bottles a small round label bearing the orrect number. This acts as a check over the number (which should be he same) upon the label containing the particulars.

STORING RESERVE SAMPLE.—The sample for the public analyst should e delivered to him without delay. The reserved samples should be kept a a cool place, and this is very important in regard to milk samples, rhich in summer time should be kept in a refrigerator. Fermentation uickly takes place, and even the best bottles will sometimes burst.

ANALYST'S CERTIFICATE.—The analyst must send a certificate to the nspector, and it must be in the form set out in the Schedule to the 1875 Act. It is advisable to adhere strictly to the prescribed form. When- ver possible the weight of the sample should be given.

The certificate should state if any change had taken place in the ample which would interfere with the analysis.

The certificate must contain in it sufficient material to enable the nagistrate to form a judgment on those materials whether the offence harged has been committed; and it must set out the constituent parts of he sample, and the reasons for the analyst's conclusions. Many cases ave arisen upon the question of insufficient information contained on the ertificate.

ARTICLES OF FOOD AND DRUGS SAMPLED AND SUBMITTED TO PUBLIC ANALYSTS.—The extract from the annual report of the Local Government Board for 1903–4 shows that during the year 1903 78,077 articles were analysed, an increase of nearly 6,000 over the previous year. The total number taken was equal to an average of one sample to 417 of the population and at the rate of 2·4 per 1,000. In London the rate equalled 4·3 samples to 1,000 of the population. Of the 78,077 samples examined legal proceedings were instituted in 3,508 cases, and fines were imposed in 2,777 cases. In 113 cases the fine did not exceed 2s. 6d. in amount, 60 being of 1s. and under.

MILK.—The number of samples of milk was far in excess of any other article of food. Of the total 78,077 samples, 33,090 were milk. The adulterated samples amounted to 10·6 per cent., while in London the adulterated samples equalled 13·5 per cent.

It is satisfactory to note the diminished adulteration of this important article of food.

From the important position which milk occupies in the human economy the consideration of its composition and methods of sophistication is desirable.

Prior to the passing of the Act of 1899 no definite standard of quality was legally demanded. Section 4 of that Act empowered the Board of Agriculture to make regulations: these are contained in "The Sale of Milk Regulations, 1901," which fix a limit. By these regulations, where samples of milk (not sold as skimmed, separated, or condensed milk) contain less than 3 per cent. of milk fat, it shall be presumed until the contrary is proved that there has been abstraction therefrom of milk fat or addition thereto of water; and further, where a sample of milk (not being milk sold as skimmed, separated, or condensed milk) contains less than 8·5 per cent. of solids other than milk fat, it shall be presumed until the contrary is proved that the milk is not genuine by reason of the abstraction of non-fatty solids or the addition of water. Where a sample of skimmed milk (not being condensed milk) is sold, it shall be presumed until the contrary is proved that the milk is not genuine unless the non-fatty solids amount to 9 per cent. These limits have now become standards, and it is a question whether they are desirable. It has been found that the average quality of milk taken in course of delivery on its arrival in large towns is, on the average, of a quality considerably above the standard fixed, and there is excellent reason to believe that its quality is reduced, by the skilful admixture of skimmed milk, so that the standard

is almost exactly complied with. The Medical Officer of Health for Islington reports that in 1903, of 120 samples taken at railway stations in Islington, only two were condemned, while of 385 taken elsewhere in the borough, 48 (or 12·5 per cent.) were reported against. The presumption that milk is not genuine because it does comply with the standard may be rebutted. In Banks *v.* Wooler (64 J.P. 245) the defendant's milk was certified to contain 3·55 per cent. of fat and 7·46 per cent. of solids not fat. It was alleged that the sample contained 10 per cent. of added water. The magistrates considered the milk exceptionally good, and the offence a trifling one, and dismissed the case.

In Smithers *v.* Bridge (66 J.P. 740) the sample of milk was certified to be deficient in fat to the extent of 30 per cent. The milk was sold as it came from the cow, and the deficiency arose from improper treatment of the cow, in omitting to milk for sixteen hours. The High Court held that milk from an improperly-treated cow ought not to be sold. It is well known that many conditions increase or diminish the important constituents of cow's milk, such as the breed of the animal, the period of lactation, climatic conditions of season, feeding, and methods of milking. Notwithstanding this fact, the standard is so low that farmers should have no difficulty in producing milk to comply with it at all seasons by carefully selecting the breed and paying attention to feeding.

CONDENSED MILK.—No standard has been fixed for the composition of condensed whole milk. Section II. of the Act of 1899 provides, however, that each tin of condensed separated or skimmed milk must bear a label in large and legible type containing the words "*Machine Skimmed Milk*" or "*Skimmed Milk.*" This does not afford much protection to the purchaser. The article is generally bought by the poorer classes, who cannot be expected to understand the nice difference between machine-skimmed and skimmed milk, but the difference in value is obvious when we know that it is possible to remove 97 per cent. of the original fat from milk by a separating machine, and not more than 60 per cent. by skimming.

In a case in which condensed separated milk was labelled "Skimmed Milk" the magistrates convicted, and the High Court upheld their decision. The article should have been labelled "Machine Skimmed Milk."

DRIED MILK.—Recently a preparation called dried milk has been sold. If the quality can be relied upon it may be largely used.

In the early part of this year a sample was found to be deficient in milk fat, and on the hearing of an action in respect of the same it was admitted that the manufacturers supplied three qualities, and by accident one of the poorer qualities had been supplied. It is a matter for regret that the manufacturers do not confine the process to full cream milk only. Such a guarantee would considerably enhance the value and sale of so useful a preparation.

BREAD.—In 1903, 561 samples of bread were submitted for analysis, and were all returned as genuine.

The most frequent method of adulterating this article is by adding alum, which enables the baker to use inferior flour. The addition of alum is an offence under the Act of 1875, and action can be taken under Section 6. It will be necessary to prove that the addition of alum is *injurious to health*, and one may be met with varying expert views. It is better to take action under the Bread Acts of 1822 and 1836. These enactments specify the materials of which bread may be made, alum being prohibited.

BUTTER.—The rate of butter adulterations in 1903 was 5·5 per cent. compared with 10·3 in 1901.

The majority of adulterations consisted in substituting margarine for the genuine article; 127 samples contained an excess of water. The total number of samples examined was 13,766, of which 751 were adulterated.

A Departmental Committee appointed by the Board of Agriculture considered the desirability of making regulations relating to the sale of butter, and regulations were made with regard to the limit of water permissible in the article. This is fixed at *16 per cent.*, and butter containing a greater proportion shall be presumed to be not genuine until the contrary is proved. The Commission also considered the desirability of fixing a standard in relation to the volatile acids in butter, and concluded that such a standard was undesirable, one of the most important arguments against such a standard being the fact that if the limit were made too high a large quantity of genuine butter, both home-produced and foreign, would be certified as adulterated, while if the standard were made too low the door would be open to the fraudulent sale of impure butter.

The sophistication of butter is generally accomplished by the addition of foreign fats, and more recently by a preparation of cocoanut oil. The process of mixing is scientifically carried out, and when the quantity of

ɔreign matter is small and added to a good quality butter, the chemical ɔmposition of the mixture corresponds very closely with genuine butter.

For some time past a mixture of butter and milk (milk-blended butter) as been extensively sold. This article contains a very much larger per-entage of water than genuine butter. Its sale is illegal, but the retailer rotects himself by disclosing the nature of the article at the time of ale.

BEER.—Few prosecutions for adulteration are instituted under the ale of Food and Drugs Acts. A few convictions have been obtained for he addition of salt. In two cases fines were inflicted where ninety-eight nd ninety-six grains of salt were found in each gallon.

Arsenic has been found in beer, due to the use of glucose in brewing ıstead of sugar. This is a dangerous impurity, and the seller would be able under section 3 of the 1875 Act, unless he could prove that he did ot and could not have known that the arsenic was present.

CONDIMENTS.—*Mustard* is adulterated with starch and colouring ıatter.

Pepper. Adulterations are more common with this article, and are ue to the advanced price. They usually consist of rice starch, ground live stones, and bleached pepper husks.

COCOA.—Cheap cocoas are usually adulterated with starch and sugar. ;enerally they are sold as cocoa mixtures or chocolate powders. Such ıixtures should be sold with a protecting label, or other form of dis-losure.

COFFEE.—Various substances are mixed with coffee to increase its ulk. Chicory is the most common, but dandelion, crushed date-stones, corns, bread, and exhausted coffee are sometimes used.

The vendors usually protect themselves by declaration to the pur-haser, or by label.

FLOUR.—535 samples of flour were submitted for analysis in 1903, nd only three were adulterated.

The materials used for adulteration are alum or a mixture of pea-flour nd other cheaper flour.

JAMS.—Jams are largely adulterated by vegetable substances, and in ddition coloured with aniline dyes. Black currant jam has been known ɔ contain apple and gooseberry.

From an examination of several reported cases, it appears (from the

small fines imposed or the dismissal of the cases on the ground that there had been no prejudice to the purchaser) that the sophistication is somewhat encouraged.

Glucose is frequently used in the manufacture of jam and marmalade, in substitution for sugar. It is now established that its use is not objectionable. It is also claimed that it prevents mildew. There is a danger, however, that impure glucose may be used.

LARD.—The adulteration of lard is not very common. Cotton-seed oil is sometimes added.

OLIVE OIL.—The usual form of adulteration is the admixture of cheaper oils, generally arachis oil. The mixed oils are frequently sold as salad oils.

TINNED FOODS.—Samples of tinned foods taken under the Sale of Food and Drugs Acts are examined for metallic poisons or preservatives.

Several proceedings have been instituted for the addition to tinned peas of copper salts to give the contents a green colour. If consumed to any appreciable extent the copper salts are injurious to health.

In the case of Summers *v.* Grist (60 J.P. 346) it was held that an offence under section 3 of the Act of 1875 had been committed in selling a 1-lb. bottle of peas containing three grains of sulphate of copper.

In an appeal case (Friend *v.* Mapp, *B. Food Journal*, 1904) the Lord Chief Justice decided not to interfere with the decision of the Justices of the Kensington Petty Sessions, who refused to convict in a case where peas contained 2·55 grains of sulphate of copper. The proceedings had been taken under section 6 of the Act of 1875.

In another case (Hull *v.* Horsnell, *B. Food Journal*, 1904) 1·87 grains of sulphate of copper being found in 1 lb. of peas, proceedings were taken under sec. 3 of the 1875 Act. Objection was taken to the fact that the analyst's certificate did not state that the addition of sulphate of copper rendered the peas injurious to health, although the analyst attended and gave evidence that it was injurious. The High Court referred the case back to the magistrates, being satisfied that the certificate complied with the requirements of the Act.

The Select Committee on Foods included amongst others a recommendation that the use of copper salts in the so-called greening of preserved foods should be prohibited. It is to be hoped that the recommendation will be acted upon.

VINEGAR.—Genuine vinegar should be brewed from *wine* or *malt*. ;he chief adulterants are pyroligneous acid, sulphuric acid, dilution by dding water, and the addition of colouring matter.

SPIRITS.—The most common form of adulteration of spirits is the adıixture of water, thus reducing the article below the fixed standard of 5 per cent. under proof for whiskey, brandy, and rum, and 35 per cent. nder proof for gin. (Section 6 Amendment Act, 1879.)

Special attention has been given of late to the sophistication of brandy y the addition of silent spirit. Genuine brandy should be obtained by he distillation of fermented grape juice. Much of the brandy sold is a ıixture, and is an entire stranger to the grape. Owing to the number of rosecutions which have been instituted, vendors now protect themselves y a disclosure upon the bottle, or by displaying notices in the bars, etc., f public-houses. Similar precautions are taken in regard to other spirits iluted below the legal minimum.

WINES.—Prosecutions under the Sale of Food and Drugs Acts have enerally been instituted for the addition of preservatives and sometimes or substitution. At Durham in 1904 a vendor was convicted for selling s elderberry wine a coloured solution of sugar and alcohol, flavoured with loves. At Belfast in 1904 a grocer was fined for selling ginger wine ontaining 7·2 grains of salicylic acid per pint. On appeal the conviction vas confirmed. In another instance coloured syrup was sold as port wine. n a case of coloured glucose syrup sold as raspberry wine at Durham in 904 the analysis showed that the article was not wine at all, but glucose yrup coloured with aniline dye. There is no evidence of any prosecution or adulteration of imported wine.

CHEESE.—The adulteration of this article generally consists in its nanufacture from skimmed milk, to which lard, oil, or some other foreign at is added in compensation for the cream removed from the milk. Such heese is known commercially as *filled* cheese, *oleine* cheese, or *margarine* heese, and a large quantity is imported. It must, however, be sold as 'margarine cheese." The fraudulent substitution of filled cheese for that nade from full milk is lucrative, producing as much as 10s. per cwt. ıdditional profit.

No standard is fixed for cheese, and it is not illegal to manufacture the rticle from skimmed milk. It may also legally contain preservative and olouring matter. (See definition of "Cheese," page 470).

DRUGS.—The Report of the Local Government Board for 1903–4 ontains the following list of drugs which were submitted for analysis:—

Camphorated oil, sweet spirits of nitre, sulphur, cream of tartar, glycerine, rhubarb preparations, seidlitz powders, linseed, magnesia, mercurial preparations, cod-liver oil, iron pills, compound liquorice powder, tincture of iodine.

The total number of samples submitted was 2,718, of which 261 were adulterated.

It will be obvious that all drugs should have a constant composition. The British Pharmacopœia should be the standard for drugs. It provides the *method* of their preparation, but unfortunately does not in *all cases* fix a standard for the article when made up. It has been held that the British Pharmacopœia must state clearly the composition of the finished article. In the case of Hudson *v.* Bridge, a sample of vinegar of squills had been purchased and found to contain only 2·5 per cent. of acetic acid. The Pharmacopœia gives a receipt for the manufacture of the drug, but does not state what the composition of the finished article should be. If prepared in accordance with the formulae it should contain 4·27 per cent. of acetic acid, but this is not stated. The High Court held that there was no standard for the drug.

In another case, White *v.* Bywater (51 J.P. 821), a chemist sold tincture of opium containing less alcohol and opium than that prepared according to the British Pharmacopœia, in which a standard is fixed. It was claimed that the inspector had not demanded tincture of opium prepared according to the Pharmacopœia. It was held by the High Court that the article supplied was inferior to the tincture of opium of commerce, and also that the inspector in asking for it was not required to ask for it prepared according to the Pharmacopœia.

There is need for alteration in the British Pharmacopœia, and each preparation should have its standard.

Proprietary medicines are excluded from the operation of the Sale of Food and Drugs Acts.

Difficulties may arise with regard to substances which have commercial as well as medicinal uses, such as beeswax, sulphur, spermaceti, etc.

In the case of Foule *v.* Foule (60 J.P. 785) a grocer sold beeswax to an inspector, and it was found to be adulterated with 85 per cent. of paraffin. Beeswax has a medicinal use and is included in the Pharmacopœia, which fixes a standard for it. The case was dismissed on the ground that the article was not a drug. The High Court confirmed the decision, implying that if it had been sold by a chemist instead of a grocer the result might have been different.

(To be concluded.)

NOTES ON THE COMMON PARASITES USUALLY FOUND IN THE BODIES OF FOOD ANIMALS.

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(MEMBER.)

THE subject of Parasites and Parasitic Diseases is one of great importance. Few people seem to realize to what an enormous extent our flocks and herds are affected by their ravages, or the losses they cause to our farmers and meat salesmen. It is in the hope that others who have to deal with the examination of meat will interest themselves in the subject that I agreed to the request of the Committee of The Royal Sanitary Institute to write the few following notes.

If inspectors of slaughter-houses would make themselves better acquainted with the parasites affecting the food animals and the conditions they produce, not only would they be doing their duty in the interests of the public health as sanitarians, but they would also be doing a public duty in assisting to reduce the prevalence of parasitic disease and the losses annually caused thereby. Not only should an inspector be able to recognize disease when an animal is slaughtered; but he ought also to know how such disease is spread.

It is not the mature parasite which always causes the trouble, but its immature form, which is usually developed in the body of an animal of a different class from that in which the parent parasite exists. The animal which harbours the parasite is termed its host or bearer, and animals which serve the temporary purpose (i.e., when the parasite is in a certain stage of development) its intermediary host. The part in which the parasite lodges is called its habitat.

Parasites are found more abundantly in some localities than others. This is also the case at different seasons, more especially as regards fluke disease, this parasite being found more largely after a wet season, which favours the existence of the snail that acts as its intermediary host. Dry seasons also favour the development of external parasites.

Parasites are most prevalent in the neighbourhood of towns; the reason being that all excreta and dust from slaughter-house refuse, which we know teems with them or their ova, is used on pastures and other lands for manurial purposes; hence animals feeding on such lands are more liable to be attacked by parasites than on land distant from towns. Woods, long grass, and underwood form protection for them, and here you have hares and rabbits, which also become intermediary hosts. Such animals as the dog are very apt to become the subjects of tape-worms; being voracious it eats up everything in the shape of flesh food that it comes across, and this often contains the immature forms of tape-worm.

The sheep, again, is very easily affected by flukes, the reason being that it bites close to the ground, and picks up the immature form of the fluke; and as it is also associated with dogs, it is very liable to pick up the ova of tape-worms which have been evacuated by them, thus becoming the intermediary host of this and various other parasites to which the dog is subject.

Parasites may be found in any part of the body, even the brain and spinal cord, young animals being more largely affected than old ones. According to eminent authors, the development of parasites may be simple (that is, directly from the ova) or complex; and in some stages of development the young parasite has no resemblance to the parent, as is the case with hydatids or bladder-worms, which are simply immature tape-worms.

How Spread.

The parasites, their ova, or embryos, are passed out of the body by the usual excretory channels, and they are also liberated from the bodies of their hosts in the ordinary processes of putrefaction and the dressing of carcases. They may be conveyed from place to place by various means, such as by water, by birds and the feet of animals, or by hides, skins, hair and wool, the distribution of refuse and offal.

After being taken in by an animal suitable for their development, a great many of the embryos (particularly those of tape-worms) penetrate from the digestive tract to different parts of the body, where they become encysted and form hydatids. As such they remain until taken into the body of a suitable host, when they further develop into a tape-worm similar to that from which they originated.

In the various works on this important subject, they are classified as follows: 1st, Entozoa, viz., those that undergo transformation inside the body; 2nd, Ectozoa, those that undergo transformation inside or outside the body; 3rd, Epizoa, entirely inhabiting the outside of the body.

As meat inspectors, Entozoa is the class of most importance, and this again sub-divided into several classes; but for our purpose it will be ıfficient to divide it into three: Cestodes, or tape-worms; Trematodes, : flukes; and Nematodes, or round-worms.

CESTODES.

The cestodes include all tape-worms and their hydatids, or bladder-orms. Hydatids are cysts containing watery fluid, and are in reality ıpe-worms in a certain stage of development, and possessing a head or eads which correspond to the heads of the tape-worms, from which they :iginated, and by which they are recognised. So far as the tape-worm concerned, it is of little importance to us, as it is seldom the cause f sufficient disturbance to render a carcase unfit for human food. ccasionally, however, especially in lambs, when the number is excessive, nditions are produced which justify condemnation of the carcase; but ıis is rare.

What concerns us most is the condition produced by the hydatids, and lso the possibility of human beings being infected by the consumption of ıe organs and tissues in which they exist. It is therefore our duty to be ɔle to recognize the hydatids, and to know the tape-worm they produce. .s I previously stated, I intend only to describe shortly a few of these ydatids commonly met with in the ordinary course of meat inspection in aughter-houses.

The most common hydatid we meet with is one known as the *Echino-ccus Veterinorium.* This is the hydatid of the tape-worm *Tænia chinococcus*, which inhabits the intestines of the dog. These cysts may e localized in any organ of the body (very often in the lungs and kidneys), ut most largely in the liver. I have also found them in the muscular tissue. 'hey vary in size from that of a pin's head to that of a large orange, and ften, when cut into, you will find that the larger ones contain other cysts f different sizes. On this account they are called the "pill-box" hydatids. f you examine these cysts you will usually find in the fluid contents a umber of little yellowish-white bodies, resembling grains of sand. Each of ıese is said to be an Echinococcus, capable of developing into a tape-worm. ı the case of the liver, they sometimes exist in such numbers as almost to isplace the whole of the tissue. I have seen the livers of cows, so affected, eighing as much as 80 lbs. In such cases the carcase will be found, as ı other parasitic diseases, to be pale and dropsical, and should be con-emned as unfit for human food. Of course it does not follow that all ırcases should be condemned, as a great many animals are affected by

this parasite while showing no effects; the carcase being in good condition after slaughter; but great care should always be taken to remove all affected organs out of the reach of dogs, and to have them destroyed.

Cysticercus Tœniacollis.—This is the hydatid of the tape-worm *Tænia Marginata*, which also inhabits the intestines of the dog. It is found in the abdominal cavity of sheep and pigs, often in large numbers, and usually attached to the omentum and mesentery, where they are suspended in a fold of peritoneum. These cysts vary in size from that of a pea to a tennis ball, and differ considerably from the *Echinococcus Veterinorium.* When you examine them you will find a white spot in the centre; this is the head, which a little pressure will cause to protrude. It is the most harmless of all the hydatids. Hundreds may exist in one animal without showing any apparent effect, the reason being that they do not interfere with the functions of the different organs as does the Echinococcus, which is always found in the organs, but the Tæniacollis is found outside or on the surface of them. In pigs they are often found attached to the diaphragm and lying on the liver, when they cause depressions, and may be mistaken for Echinococcus; but with a little care they can be removed, and on close examination will be found to contain a head and long neck, which is characteristic of this parasite. It is very rare that a carcase is condemned on account of it.

Cœnurus Cerebralis.—The cystic form or hydatid of the tape-worm *Tœnia Cœnurus*, which also inhabits the intestines of the dog, and is the one which gives rise to the condition known as "sturdy" in sheep. It is usually lodged in the brain. If the head of the sheep which has suffered from the effects of this parasite be carefully opened, it will be found that the gradual growth and pressure of the cyst will have displaced the brain substances in the part where it was lodged. This parasite is mostly found in young sheep. If the animal is slaughtered as soon as the symptoms are discovered the carcase will be found in good condition, and, with the exception of the head, may be passed; but if the sheep is allowed to live any length of time it will gradually become emaciated, and should be condemned as an emaciated carcase.

Cysticercus cellulosæ.—The hydatid of *Tœnia solium*, a tape-worm which inhabits the intestines of human beings. This cyst is found in the connective tissues of the muscles of the pig throughout the body. It is somewhat flask-shaped, and varies in size from that of a millet-seed to a small pea. During life its presence may be detected by an examination of the tongue, on either side of which rows of what appear to be little blisters may be observed. After slaughter of the pig, in the exposed muscular

tissue you will notice numbers of small blebs, like grains of rice, which can easily be taken out with the point of a small knife. The muscles are usually pale and flaccid in appearance. The carcase does not set well, and quickly decomposes, and should be condemned. Occasionally you will find that the cysts have undergone calcareous degeneration, and when the flesh is cut, a grating sensation is felt, as if cutting through sand. Happily, this disease is now becoming very rare. About eight or nine years ago it used to be very common amongst Irish pigs, which was no doubt due to the method of feeding, but now it is very difficult to find a specimen. Out of nearly eighty thousand pigs which were inspected, after slaughter, in the Metropolitan Cattle Market during 1904, not one was found affected with "measles" (the trade term for the disease).

Cysticercus bovis (or Beef Measles).—The hydatid of *Tænia mediocanellata*. This disease resembles very much the disease in pigs. It is said to be very common in India, but is very seldom seen in this country. I have seen only one case.

As in pork and beef, we have also the mutton measles, i.e., *Cysticercus ovis*, but I have not seen a specimen, and I am not aware that it is known what tape-worm gives rise to it.

Cysticercus pisiformis.—The hydatid of *Tænia serrata*, commonly affecting sporting dogs. The cyst is about the size of a pea, and is usually found attached to the omentum of rabbits and hares. You will often notice when disembowelling these animals that numbers of these cysts are attached to the omentum, and occasionally to the diaphragm. They do not seem to have any effect on the rabbits, but should be carefully kept out of the reach of dogs and destroyed.

Another cyst which is found in rabbits is *Cysticercus serialis*. It is the immature form of another tape-worm of the dog, i.e., *Tænia serialis*, and is larger and more important than the previous one. It is found under the skin and between the muscles, varying in size from a hazel nut to a pigeon's egg. It can often be discovered in a live animal by passing the hand along the back, when you feel slight elastic enlargements. In the carcase, after the skin has been removed, they will be found throughout the body in the connective tissue between the muscles. Such a rabbit is unfit for food, and should be condemned. The muscles are usually pale and flabby.

The foregoing are hydatids most commonly met with during the course of inspection in slaughter-houses. There are others, but not of so much importance to food inspectors.

At the commencement of these notes I said that very few of our larger

food animals were the subject of the tape-worm, but in the autumn, when young sheep are being slaughtered, a great many will be found affected with a tape-worm known as *Tænia expansa*, specimens of which can often be obtained measuring three to four yards. In the majority of sheep they seem to do little or no harm, but there is no doubt that if care were taken to examine the bowels of many of the lambs that are condemned through being emaciated (or being, as the farmers say, "bad doers"), it would be found that this tape-worm was the cause.

Trematodes.

Trematodes are flat worms, commonly known as "flukes." The one of greatest importance to us is the common fluke, *Distoma hepaticum*, but which is now known as *Fasciole hepaticum*, the former name being applied under the supposition that it had two mouths. This parasite resembles very much the fluke or flounder fish, and is found mostly in the liver of sheep, its habitat being the bile ducts. It is also common in cattle, occasionally present in the horse, and is said to be also found in man. It attains a length of about three-quarters of an inch, but occasionally larger specimens may be seen. In cutting into the liver affected, you will find specimens varying in size from one-eighth of an inch up to the length afore-mentioned. They are of a slaty colour when freshly taken from the liver. This parasite is the cause of very great losses to our farmers and anxiety to inspectors. It is sometimes found in the lungs of both sheep and cattle, but there does little harm, as it soon becomes encysted. The wall of this cyst is usually calcareous; when cut into, it is found to contain a peculiar chocolate-coloured fluid. These cysts are usually found at the lower end of the lungs, and cannot be mistaken for anything else, as no other cyst contains this peculiar coloured fluid. Fluke disease (or, as it is usually termed, "liver rot") occurs most largely during the spring following a wet autumn. This is due to the fact that for the development of the parasite, and also for the existence of its intermediary host (the fresh-water snail), moisture is necessary. It will be noticed on examining the livers of sheep and cattle which have been invaded by flukes, that the bile ducts stand out on the surface, and owing to this such livers are termed by butchers "pipey" livers. Many of them on being cut into are hard and gritty, owing to their having become calcareous. It will also be noticed that many of the bile ducts become dilated and form pouches, which are usually filled with the parasites.

In the early stages, or when sheep are first infected with this parasite,

the irritation it produces in the bile ducts seems to increase the flow of bile; and on account of this the sheep seems to thrive rapidly, and if slaughtered at this stage, the carcase will be found in good condition. When the parasites are present in excessive numbers they are very apt to cause jaundice, and as time goes on they eventually cause cirrhosis of the liver, thus preventing the organ fulfilling its proper function, and the animal gradually becomes emaciated and dropsical. The appearance of the carcase is described as being pale, wet, and flabby, it is innutritious, and certainly unfit for the food of man.

NEMATODES.

For our purpose the most important to us of this class of parasites are those which inhabit the bronchial tubes: these are small round worms which cause considerable trouble, and are found most largely in the calf and sheep, but occasionally in the pig. In the different animals they have different names, although some are of opinion that it is the same parasite in all. The one in the sheep is known as *Strongylus filaria;* in calves, *Strongylus micrurus;* and that in pigs, *Strongylus paradoxicus.* They produce what is known as verminous bronchitis. They vary in length from an inch to two inches, and as they inhabit the tracheæ and bronchial tubes they are a source of continual irritation, causing animals to be constantly coughing. This condition is very prevalent in young animals, and is known as "hoose." If during lifetime the parasites are present in excessive numbers, they produce the conditions already mentioned as being common to all parasitic affections, a wet and flabby condition of the carcase. In the lungs will often be found consolidated patches. Unless the carcase shows signs of emaciation and fever, it is usual to condemn the lungs only.

There is another parasite found in the lungs of sheep, known as *Strongylus rufesens.* It is very much smaller than the above, and exists more in the substance of the lung. The eggs or embryos are deposited almost immediately under the pleura, forming little nodules which are usually of a greyish-yellow colour. This condition is found in adult animals, and is very common; it is called by many "pseudo-tuberculosis" of the sheep. It will be found that the lungs of at least 60 per cent. of all sheep slaughtered are affected by this parasite. It does not seem to have any effect on the carcase, as it will be noticed that the majority of the sheep are in good condition after slaughtering. This condition of the lungs has been mistaken for tuberculosis, but that disease seldom affects sheep, the writer having found only three cases in those animals during the whole of his experience.

Trichina spiralis.—This is a very small worm which, for its complete development, requires also to find its way into two different hosts. The embryo, or immature worm, is usually found coiled up in the muscular tissue of the pig. This disease is very common in Germany, but fortunately it is rarely seen in this country, only two cases having come under my notice, one being an English pig, and the other a ham from the United States. In newly-dressed carcases the condition is very difficult to recognise without a good lens; it appears like little grains of yellow sand throughout the muscular tissue, each of these is in reality a small calcareous cyst, which contains immature trichinæ. In the case of the ham, however, it is recognisable with the naked eye. This is no doubt due to the contraction and drying of the tissues during the process of curing. When such pork or ham is eaten, we are informed that the calcareous shell of the cyst is dissolved by the action of the digestive juices, and the embryonic worm liberated; and in the intestines in the course of two or three days they reach maturity, and are known as Bowel Trichinæ. These give rise to enormous numbers of young trichinæ, which burrow out from the intestines, enter the muscular tissue, and again become encysted. In this condition they are harmless, until again taken into the body of another host.

Gut Tumours.—Gut tumours, or pimply guts: terms used by gut dealers for a condition found in the intestines of sheep and cattle. This condition is reported on fully by Cooper Curtice, in his excellent report on the parasitic diseases of sheep to the American Bureau of Agriculture in 1890, in which he states that it is produced by a small worm, which he names *Œsophagostoma columbianum.* This parasite is very common in United States sheep, rendering the gut useless; and it has been found that about seventy-five per cent. of the sheep imported to this country from the United States and Canada are subject to this disease. Recently great numbers of British Cattle and sheep have become affected with this parasite. The mature worm is about three-quarters of an inch in length, and is found in the intestines. The embryo, or immature worm, burrows into the intestinal wall and becomes surrounded by greenish-yellow cheesy matter, forming small tumour-like enlargements in the small intestines. As the gut of sheep and cattle is largely used for making sausage casings, it will be seen how necessary it is that careful inspection should be made of it as well as of other edible parts of the carcase. This condition is the cause of very great loss to the gut dealers and contractors, as, when cleaning, those little tumours often leave a hole and render the gut useless as a sausage skin. It is possible that if a

little extra care were exercised by the cleaners when dealing with such gut, the tumour would be left on. This I know to be the case, as I have myself seen in the window of a shop not far from the centre of London beautiful smoked sausages with rather suspicious dark spots on the outer casing. It may be interesting to readers to know that precautions are being taken in Germany, under the German meat inspection laws, to prevent the importation of such skins into that country; all barrels containing gut being opened at the port of landing, and when found to be infected with the parasite, destroyed, and the consignor charged with the cost of destruction.

My opinion is that the disease is spread among cattle and sheep in this country owing to the careless way in which this gut is dealt with in abattoirs. It is usually thrown with the manure, which is sent out without being treated in any way to farms, and the parasites and their ova conveyed to the land on which our food animals graze.

THE WASTE OF INFANT LIFE.

By J. T. C. NASH, M.D., D.P.H.,
Medical Officer of Health, Southend.
(MEMBER.)

THAT there is a fearful waste of infant life in this country every year is a well-established fact. Much serious and praiseworthy attention has been given to the subject by the medical profession, and also by various municipalities under the advice of their respective medical officers of health.

Many facts have been noted; much reasoning power has been exercised; many sound deductions have been made; some of the causes of excessive infantile mortality have undoubtedly been discovered; and various remedial measures have been devised.

But other facts have not yet been sufficiently noticed or recorded, or have altogether escaped attention hitherto; further deductions yet remain to be made; numerous causes yet require to be discovered; and additional remedies to stay the frightful waste of infant life yet remain unknown and untried.

Overcrowding; want of ventilation and sunlight; maternal occupations; improper methods of feeding; proprietary so-called infants' "foods"; the lack of fresh food (that is, of the antiscorbutic elements); the vices of parents (particularly intemperance); all these causes contributing to a high infantile mortality have been discussed, and attempts have been made to remedy them on the lines I have already indicated. Latterly much attention has been given to the sanitation of cowsheds and dairies, and a cry for a clean milk supply has gone up.

This matter of a clean milk supply is perhaps as important as all the other causes I have mentioned put together.

Unclean milk, whether fresh or condensed, is responsible in my opinion for the greater part of infantile mortality. But now I come to my personal observations, reasonings, and deductions, and I venture to lay stress on the remedial measures which I now submit.

My observations and points are these:—Dirty milk supplies (as regards

lection and transit); overcrowding; want of ventilation; maternal upations; improper feeding; parental vices, etc., are all in operation the year round, if anything probably accentuated in the winter. But chief season of excessive infantile mortality is the hot season: late nmer and early autumn.

The late Dr. Ballard of the Local Government Board many years ago nted out that the seasonal incidence of diarrhœa usually coincided with time of the year when the ground temperature rises to 56° F. or more 'our feet below the surface, and he assumed that such temperature was essary for the evolution of some micro-organism capable of causing rhœa existing in organically-polluted soil.

But at a meeting of medical officers of health in the county of Essex, vened by Dr. Thresh in November, 1902, in order to discuss the stion of infantile mortality in the county of Essex, I pointed out that ing the summer of 1902 the four-feet earth thermometer had exceeded F., and that this temperature had been maintained for some weeks hout the usual incidence of infantile diarrhœa. But the phenomenon ch had struck me with great force during the summer of 1902, was extreme dearth of the ordinary housefly, *Musca domestica*; indeed, re were few flies to be seen throughout the summer. This led me to nsider the whole question, and my deductions led me to conclude that Ballard had probably gone astray in that position of his hypothesis ch suggested that certain special meteorological conditions were neces- r for the life-processes of *some special diarrhœa-causing micro-organism.*

My own observations, deliberations, and conclusions led me to suggest he Epidemiological Society of London, in January, 1903, and again in il, 1903, that the seasonal circumstances mentioned by Dr. Ballard e essential for the development and multiplication of the common sefly, and that this insect was the really responsible creature for lemic diarrhœa, carrying infective material from all manner of filth ct to food supplies. This theory was supported by the fact that in the y part of September, 1902, flies became fairly prevalent, and co- dentally diarrhœa, which had hitherto been conspicuous by its absence, sed thirteen deaths in Southend. Then came a spell of cold weather; flies rapidly diminished in number, and no further deaths from diarrhœa e recorded.

Diarrhœa is but a symptom, and may be due to the action of various ns, such as the typhoid bacillus, Gaertner's bacillus, certain strains of *oli*, Bacillus Shigæ, the bacillus of influenza, etc. The domestic house- in common with many other flies, is bred in and feeds on dead and

decaying organic matter, such organic matter as is rich in various kinds of putrefactive and other germs. Wherever there is an open wound, a festering sore, a liquid or solid fæcal evacuation, milk, sugar, meat, fruit, etc., there will flies congregate.

Refuse heaps and brick-fields, where organic refuse of all kinds is taken for the purpose of brick-making, abound in flies, which breed freely in such collections, particularly when the warmth of summer comes round. In midden-privy towns, flies and their larvæ will be found in abundance in these insanitary abominations.

The more favourable the meteorological conditions for the breeding of flies (such conditions as are found in hot summer), the larger will be the numbers of flies that will come into existence, and the greater the amount of polluting material that will be carried by the greater numbers of flies to milk and other articles of food. Consequently, the more epidemic will summer diarrhœa become if articles of food are left exposed to flies. Milk being the chief food of hand-fed infants, and an ideal medium for the multiplication of bacteria, while at the same time it is a most attractive food for flies (to such an extent indeed that numerous flies fall victims by drowning in this nutritious fluid every summer), it is easy to see why hand-fed infants are the principal victims of summer diarrhœa.

My own observations, and those of Dr. Newsholme and other observers, make it fairly conclusive that *milk is polluted to a greater extent in the home of the consumer than before delivery.* The reports of Dr. Hope, Dr. Niven, and of numerous other medical officers of health, make it evident that *condensed milk* is frequently the form of nutriment that is being taken by infants suffering from epidemic diarrhœa.

Many have been led to conclude from this that the comparatively poor quality of such condensed milks when diluted as directed on the labels, or the rapid growth induced by warm weather of germs already in the condensed milk, are potent factors in infantile diarrhœa. For my part I think both these factors probably have but little to do with the incidence of infantile diarrhœa.

Condensed milk is taken all the year round, but epidemic diarrhœa is a distinctly seasonal disease. The contamination of such condensed milks by polluting flies in summer (which crowd in battalions upon every exposed open tin), affords an easy and probable solution of the problem why such milks prove so dangerous in the late summer and early autumn when flies abound. It also explains why in a cool and wet summer, when flies are scanty, epidemic diarrhœa is conspicuous by its low incidence.

The waste of infant life which during the whole year through is undoubtedly due to such causes as *malnutrition* from improper or insufficient articles of diet, overcrowding and general insanitation, drunken parents, and neglect in general, is accentuated a hundred-fold in the diarrhœa season by the agency of flies.

To successfully combat the causes of infantile diarrhœa will reduce our infantile mortality by from 20 to 50 per cent.

The fly plays a useful part as one of Nature's scavengers. Where flies abound I think it may be taken as a justifiable inference that decaying organic matter also abounds somewhere in the neighbourhood. The only proper and effectual method of limiting the number of flies is to have proper, effectual, and speedy methods and means of disposing of all forms of organic refuse.

Midden-privies, slaughterhouses, cowsheds, stables, mews, and poultry-runs in towns, are in my opinion incompatible with true sanitation.

I hope the time is not far off when it will be illegal to have any such abomination within at least 100 yards of any dwelling-houses. As for brickfields or other places where decaying organic refuse is deposited by the cartload or the ton, such businesses should be prohibited within at least a quarter to half a mile of dwelling-houses, and it should be equally illegal to build new dwelling-houses within a quarter-mile of such places.

If such law existed questions of compensation would not arise, and few injunctions would be required or asked for.

Another important factor in the prevention of summer diarrhœa is the proper scavenging of streets. The methods adopted in most towns at the present day are almost worse than useless. It is absolutely essential that all street cleansing should be effected while the organic *débris* is thoroughly wetted, either by rain or by a properly constructed water-cart which will effectually flush the street channelling, where all organic dust tends to accumulate. The dry sweeping of streets is an insanitary procedure, and is in my opinion responsible for many sore throats and other illness.

While I am fully in sympathy with all efforts to improve the purity of our milk supplies; the scavenging of our streets; the prevention of imposture in connection with so-called infants' foods: although I deprecate the employment in factories of nursing mothers, or those about to become mothers, I yet think the most important measure open to us is the education of our future mothers in the rearing and care of infants.

The appointment of lady health visitors and lady sanitary inspectors to

act under the direction of the medical officer of health in carrying the gospel of health into the homes of the workers will prove, I think, one of the most effective measures yet devised.

It is of course necessary that these health missionaries should be provided with effective weapons in the shape of well got up precautionary printed pamphlets wherewith to carry on the campaign against ignorance and insanitation. These pamphlets should bear the authority of the medical officer of health.

The tendency at the present time among medical men in prescribing food for young infants which cannot be breast-fed, is to prescribe pure cow's milk modified on scientific lines so as to more closely approximate to the chemical composition of such modified cow's milk to that of human milk, than has been the practice hitherto. I trust the time honoured but indifferent "Oh give it two parts of barley-water and one part of milk every two hours" will soon cease to be the prevailing advice given. Cow's milk so prepared is inadequate for the nutritive needs of the infant.

The food for such infants should be carefully prescribed as is done at the Infants' Hospital, so that a medical man should know what proportion of cream, lactose, proteids, and water is being introduced into his young patient's body. Scientific laboratories, like the Gordon Walker laboratories, should be multiplied, and every town or district should have one, or subscribe to one at a short distance away. These laboratories should have a grant from the State or from the local rates, in return for which the milk as prescribed by the physician should be available for the poorer classes at a price not exceeding 3d. a quart.

In the meantime municipal milk depots on the lines of those in existence at Liverpool and Battersea have much to recommend them, but I should like to see some large private milk dealers in competition with municipalities on truly sanitary lines.

HYGIENE IN EDUCATION.

By I. WHITE WALLIS.

(MEMBER.)

THE Suggestions for the consideration of teachers now issued by the Board of Education indicate the adoption of new methods in elementary education. These may eventually afford an opportunity of putting into practice the more rational principles which have been developing during the past decade; principles which relate both to educational methods and to the conditions of health essential to carrying on the work of instruction in schools.

The first principle laid down is that the child's education should be useful to himself, because

> " . . the child's time at a public elementary school must needs be limited; every subject of the curriculum must be shown to be of value, and the value of any subject may be discounted by indifferent teaching. The child's education should be useful to himself, and, in so far as it makes him a better citizen, to the community."
>
> "The child must be brought to feel that the course of study set before him is not only a part of the discipline of youth, but bears some relation to human life, its interests, and its needs."

This is the keynote for which the hygienist and the sanitarian have striven since the days of Dr. Parkes, who, more than thirty years ago, closed his survey of Public Health with the words:

> "Were the laws of health and of physiology better understood, how great would be the effect! Let us hope that matters of such great moment may not always be considered of less importance than the languages of extinct nations, or the unimportant facts of a dead history."

It takes into account the common sense view of all school education, that while the method in which a child is trained is important to develop independence and thought, yet the material upon which he is trained—the subjects for his learning should be those which are nearest to (and not, as is frequently advocated, the remotest from) his individual life, and which will first of all conduce to his own and others' comfort and well-being. Paramount among these of course is health, and the Board of Education has attempted to grapple with this question by first impressing upon its

teachers that their attitude of mind towards the pupils must be that of discrimination, in order to secure healthy conditions of life and individuality of character to deal with them. This attitude so closely affects the question of health in school and school life, that it may be well to glance at it before passing on to the direct physiological aspect.

To obtain this kind of teaching the Board of Education states that

> " . . . the only uniformity of practice that it desires to see in the teaching of public elementary schools is that each teacher shall think for himself, and work out for himself such methods of teaching as may use his powers to the best advantage, and be best suited to the particular needs and conditions of the school. Uniformity in details of practice (except in the mere routine of school management) is not desirable even if were attainable."

Suggestions such as these introduce at once the wisdom of discriminating among pupils. Not only will different curricula have to be adopted for country and town schools, but in the towns and cities distinctions must be made as to the different status of poor children in order that their education may be made useful to themselves. Their immediate environment must be taken into account. The conditions of their present life in relation to housing, feeding, &c., which render it probable that certain subjects will be useful in their after life—and the conditions of the preceding generation even, inherited tendencies to disease, which will throw light upon the probable ability or disability of a child to assimilate the knowledge brought before it.

As an instance in teaching housecraft there is valuable suggestion in the following paragraph:—

> "In each branch of instruction the apparatus and fittings used by the girls should be similar to those likely to be found in their homes.
>
> In cookery lessons the aim should be to give thoroughly practical instruction in the choice and preparation, with due regard to economy and the home circumstances of the children, of the essentials of a wholesome diet. No attempt should be made to give instruction in the higher branches of cookery or in anything outside the ordinary possibilities of a simple artisan household; nor should theoretical instruction as to the methods of cooking, or as to the principles of digestion, go beyond what is necessary for a general understanding of the methods practised, and of the general lines on which the diet suitable for different ages of life must be regulated."

Now, if the question of discrimination is carried far enough to help the child of the slum to learn how to be clean, and to get the best ventilation under slum conditions, and to cook cheap nourishing food in the one utensil the family possesses, and in the one room that constitutes the home, a room in which usually no provision is made for conveying or removing water, then a decided step will be made in uplifting the slum dwellers to

little higher level, from which as a whole they can rise still higher in ıe next generation.

This discrimination of circumstances seems not to have been contemated in former schemes of education, which have dealt with the eleentary class of children as though their intellectual capacities, their pabilities of character formation, and their future opportunities were ual. The acknowledgment of the inequalities among the children, and e appreciation by the Board of Education that "to give each child his ıance" means to treat children differently and not all alike, is a step that es a long way towards meeting the view of ordinary ratepayers as to a ise education for the lower classes.

This still more individual discrimination is shown in such clauses as the llowing:—

> "The establishment of character must always be one of the main aims of elementary education, and every part of the school life has some influence in this regard, whether for good or for evil. We endeavour, for instance, to adapt the teaching to the attainments of the scholars, not merely to secure due intellectual progress, but because children will acquire the bad habit of idleness both when the work demanded of them is too easy and also when it is too hard."

Again, in discussing the grading of children within a class, the followg good suggestion is made:—

> "The scholars, combined in large groups for lessons which can be given in common, can be graded in smaller classes for subjects which require individual instruction. In this way the scholars may be made to feel that, whether they are taught in larger or smaller groups, their progress is watched and that promotion is awarded to merit: an effective incentive to industry is thus provided."

Turning now to the physiological aspect of the scholars and their ealthy condition in school. It is interesting to note, as a corollary of the fforts that The Royal Sanitary Institute has directed to the subject of hool hygiene since the passing of the Education Act in 1888, by comıunications to the Board of Education and other educational authorities, y the suggestive and explanatory Syllabus of School Hygiene which it has ublished for its examination, by the special conferences and the resoluions passed at its meetings, many of the ideas advanced by the Institute ave been embodied in the Suggestions of the Board of Education.

Firstly, there is the placing of the inspection of school conditions in he hands of the children themselves, beginning from the lowest classes, who are to have object lessons on school fittings and equipment in their wn buildings; who are to be trained to think by finding out their uses,

and are to be led to consider how far such matters of health surroundings can be introduced into their own homes. If faithfully carried out these suggestions will be most productive; for, as the Institute's Syllabus puts it: "The general activities of a child's mind may be made use of to secure the proper employment of such fittings by the child himself, and his natural assertiveness will pass the knowledge on, and see it put into practice in homes and schools by younger children." And, the Syllabus might have added, these activities will be of great service to the teachers in noting lapses from perfection, which are more likely to occur in the maintenance than in the construction of apparatus.

The following selection of subjects occur in a classified list of topics for observation lessons, nature study, and the rudiments of elementary science:—

"*The rooms.*—Their shape, size, etc., to be ascertained by children's measurements. Out of school observations of the rooms in the children's homes to be demanded for comparison and contrast.

Bricks.—Their size and shape to be measured by the children. If any brickworks are near, the manufacture should be observed by the children. Common stones used in building and paving.

Doors.—Position, why panelled; sizes of several to be measured by the children, reason for stock sizes; fastenings; construction of locks, how a key works.

The lighting.—Windows, position; sizes to be measured and compared. How the glass is fixed. Where the desks are placed in relation to windows, and why.

Gas.—Observe the flame of burning coal. The teacher can make coal gas before the class. Where the gas that is burnt in the school is made. Trace the course of the gas pipes as far as possible; explain the gas meter; Other lights, petroleum and paraffin, simpler properties and uses. Lamps.

Methods of heating.—Fires; use of chimneys. Hot-water pipes.

Ventilators.—The scholars should observe the means of ventilation, doors, windows, Tobin's tubes, gratings, etc. Measure the space per child of fixed inlet and outlet ventilation.

Desks.—Materials; colour: whether varnished and why; shape, the reasons for it; size to be measured by the children and compared with the height of the teacher's chair and table.

Books.—Material; size; shape; how covered; reasons for differences between reading books, exercise books, copy-books, reference books such as dictionaries, pocket-books, prizes. Type, compare with newspaper type. This should lead to the establishing of Pica for all school books.

Miscellaneous school objects.—The ink wells, material; whether glazed, if so, why! shape. Ink. The bucket, coal scuttle, grate, cupboard, the pencils, pens, chalk, coal, matches, etc.

The playground.—Size, shape, methods of paving (compare with street pavement).

The river basin in which the school is situated.

Construct a model fountain and make simple observations on the pressure of water. Mill-dam. A "head" of water. Notion of falling water as a motor.

Soils.—Clay, sand, slate, granite, chalk; quarries near school; gravel pits, clay pits, brickworks. (Note how the rocks lie, in layers or in masses without structure.)

Freeze some water in a bottle and note bursting of bottle. Bursting of pipes."

Then children are to be trained in the care of health by instruction put into daily practice.

"All children should be trained in good habits by the teachers, and should receive simple instruction which will enable them to observe the principal rules for the preservation of health. The effect of this teaching will be the greater, the more the principles impressed upon the scholars are illustrated in the daily routine of the school."

"In cases where the lavatories are much used, special attention should be paid to keeping them scrupulously clean, and the children should be taught to allow the dirty water to run away after they wash and to flush the basins with clean water. Boys especially may require supervision to make sure that they wash thoroughly before using the towels, and these should be promptly removed when soiled."

"The scholars should be asked to observe a room which is to be cleaned the next day, and should be asked to observe it again when it has been cleaned. They will learn in this way to notice dust or dirt on the floor, the furniture, or the windows."

"In bright sunshine they should be asked to look at the dust in a sunbeam's path, and they will understand that dust is always in the air whether they can see it or not."

"The teacher should tell the scholars that dust and dirt are not only unpleasant, they spoil books and clothes, and are bad for health."

"People who allow themselves and their homes to get dirty are not so strong as they would be if they were more careful in this matter."

"They should be told also that their underclothes should be changed and washed once a week; and that when they leave their bedrooms in the morning they should take the bed-clothes off the bed and spread them out over a chair, or over the end of the bed. Whether they sleep with open windows or not, they should always open the windows wide before leaving the bedroom if they are strong enough to do it for themselves."

Of course there are a few anomalies, and the Board of Education shows a very keen sense of humour in requiring infants to attend morning school under the age of five; inducing teachers to obtain the infants in the afternoon by allowing additional half attendance to be granted towards the total number of attendances reckoned for grant, and then issuing the following suggestion to teachers under the heading, Sunshine.

"Infants should be taught that it is good for them to be out in the sunshine; they require sun for growing as much as plants and flowers."

The quantity required by plants and flowers is *all* that the English climates bestow.

On behalf of the elder children, for whom the period of necessary recreation is limited to ten minutes by the code, and whose school hours practically occupy the whole of the day's sunshine from the age of three to fourteen or fifteen years, the following tame suggestion is offered to teachers:—

> "The teacher should encourage the scholars to go out of doors on Saturdays and Sundays, and during their holidays for some part of every day, especially in fine weather, and to take walks in the country if possible, or, if not, in the public parks and gardens. They should be told that this is one of the things that help them to grow and become strong."

As to sleep, it is suggested that

> " . . It would be well to tell the infants that it is good for them to go to bed early—at seven o'clock if possible—and have a long night's sleep; it would hardly be necessary to enter into the number of hours. Young children should get into good habits almost unconsciously, without spending time in *thinking* what is bad for them."

The "Suggestion" paragraph throws light on a man's knowledge of child life to a remarkable extent, and it makes it pleasant to remember that women inspectors are being appointed in larger numbers, and that there is now an office of Chief Woman Inspector at Whitehall; and perhaps the next year's editions of suggestions may provide for children under seven being allowed to take their mid-day sleep at their desks. It would certainly be an expensive method to the country of obtaining sleep for the infants and uncomfortable for the baby, but would be less likely to foster insanity than the present method of constantly waking infants up in class to take their turn at making the letters of the alphabet.

The "Suggestions" contain a special dissertation on temperance (with regard to drink only) in connection with hygiene. It seems a pity that education, which is to train man in self-control on all matters, should be hampered by too much concentration on one evil of life. The passion for strong drink in the country must be checked, like other passions which destroy wholesome living, by fostering habits of self-restraint in individuals, a mastery of self instead of an indulgence; and the localising of effort on one point is likely to weaken effort in the all-round control which makes for character.

It would be well to notice, too, that the arguments for temperance are bolstered up by an indiscriminate condemnation of all liquid except milk and water, and by a rather unphilosophical use of half-truths.

> "Milk contains four different things: water, sugar, fat, and curds. There are other things which are important, but not so important as these.

Milk is all that babies want, and all they ought to have. It is very bad to give a baby anything else. Milk also contains all that is really necessary for older people, though they do not live on it."

Such teaching would destroy as many babies as it would save, as, until the age of four or five months, milk without the addition of water and sweetening would cause constipation and fits or incessant sickness.

Again, it is not a whole truth that milk contains all that is really necessary for older people, because it is always necessary to stimulate appetite through taste, and this requires variety. Should such shallow treatment of the subject of foods lead to experiments on milk diet for elder children, the result would be failure, brought about in a slow, insidious manner. It takes years to recover from experiments such as these that are constantly being made by half-taught faddists, greatly to the detriment of the country's general health.

Again, it is stated:

> "Tea, coffee, cocoa, and chocolate are all nearly the same, all produce nearly the same effect. Some people take these and say that they cannot get on without them, and are all the better for them. Other people never take these things and do very well without them. Until two hundred years ago no one in England took these things. They are not necessary like the foods which we use to make the substance of our bodies, such as meat, bread, fat.
>
> People who have worked so hard that they are tired out need real food and a good rest.
>
> Tea and coffee and cocoa and chocolate help people to put out their strength faster than if they did not take them; but they do not give any strength which is not already there, they only help people to tire themselves more than ever."

But cocoa and chocolate are in a measure real food, containing both sugar and starch. And though two hundred years ago these drinks were not taken in England, a great deal more beer was drunk, general tipsiness was more prevalent, and life was spent at a much lower speed than it is now.

Unwise generalisations are to be found in other parts throughout the hygiene paper, as in the case of burns, it is taught:

> "If a person's clothes take fire the *only* sensible thing to do is to suffocate the fire. The person should be made to lie down and should be covered with sacks, rugs, or other heavy things, which should be pressed tight on the burning garments."

Such rule-of-thumb teaching is harmful; it checks instead of encouraging, the use of common sense, which must practise itself to grasp the situation in cases of emergency, and be able to think quickly what remedy to apply under the existing circumstances.

If teachers are to successfully train the young in the practice of healthy and right living, they must study and train themselves in a more judgmatic manner than any at present laid down by the Board of Education; and it is not remedial work belonging to the medical man alone that is wanted, but *preventive work*, the joint knowledge of engineers, architects, doctors; indeed, nothing less comprehensive and practical than the syllabus prepared by the Institute for their examination will cover the need of the day, while it should not be considered necessary for teachers to specialise in physiology, sanitation, or mental and moral hygiene beyond the scope indicated by that syllabus.

So far attention has been drawn to the instruction and training to be given to the children by the teachers. Now it will be interesting to trace the Suggestions made for the teachers' own practice of health rules in school life. In these the psychological and moral, as well as the physiological, aspects of health—or as it is preferably called hygiene*—that have been pressed upon the Board of Education from time to time, have been appreciated and adopted to a much larger extent than formerly. Some of the Suggestions, however, are open to criticism.

> " *Ventilation.*—No matter how complete the arrangements for the continuous ventilation of a class-room may be, the scholars should leave the room at least once during each meeting, and the doors and windows should be thrown wide open. Before and immediately after each school meeting the windows and doors should be opened to their fullest extent in order that the school may be thoroughly flushed with fresh air. No lesson in physical training should be given with closed windows.
>
> *Lighting.*—Where the lighting of a school is not good it is necessary, until improved arrangements can be made, to adapt the Time Table carefully to meet the difficulties which are found as to certain subjects. Needlework, especially the working of specimens, writing and drawing should all be so placed in the time table that the work may be done when the light is most favourable. In winter, when the days are short, the time at which these lessons are given may require frequent alteration."

This clause overlooks the fact that just as perfect lighting is required for reading as for sewing, writing, and drawing. Where favourable conditions cannot be obtained for all eye-work, eye-work must be abandoned.

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* It is a pity that a false prejudice has arisen against the word hygiene, and that an attempt is made to substitute for it the cumbrous expression "the simple rules of health." There is no exact equivalent in the English language for the word Hygiene, which means the modification of the simple rules of health to meet the artificial circumstances of civilized life, and includes the idea of prevention—a knowledge of how to prevent the artificial circumstances interfering with health. It is a scientific word, but no objection should be raised on the ground of its accuracy, if it is granted that the word is used to describe the knowledge and not as an empty form.

"*Heating.*—The temperature of a room used for teaching should be kept, as far as possible, at 60° F. A temperature below 50° F. is too low for young children, and a temperature above 70° F. is unhealthy, and tends to loss of muscular tone and of general energy.

If the school is warmed by open fires or stoves a dish of water must be placed near the source of heat, in order that the air of the room may be sufficiently moistened. Otherwise the throat, eyes, and mouth become dry, and the work of both teachers and scholars becomes difficult.

Equipment.—In the school-room there are certain points of equipment which have an important bearing on health. The desks influence the posture and attitude of the children for long periods, and if too large or too small may tend to produce permanent bodily distortion. The more recently equipped schools provide desks of graduated size in order to suit children of different ages, but it is still common to find children—especially girls, who often grow rapidly after ten years of age—sitting at desks many sizes too small. In such cases new desks properly adjusted to the height of the scholars should be at once obtained. Long parallel desks are objectionable.

In many schools the infants are still cooped up in steep, long-desked or even deskless galleries. This practice should be abandoned at the earliest practicable moment, and the gallery should be replaced by suitable desks or chairs placed on the floor.

Posture.—Even if the children are sutiably seated the teacher ought not to neglect their posture during lessons, more particularly during lessons in which they write or draw. Every lesson in which the children write should begin by securing a correct position, and the direction should be repeated by the teacher if the scholars are found to assume unsuitable attitudes.

A child when preparing to write should be required to sit upright and square to the desk with his feet firmly planted in front of him on the floor or foot rest; and the teacher should never allow a deviation from these two essential points to pass uncorrected, though if these points are secured it is perhaps better to neglect minor points. No child should ever be allowed to lean with his chest against the edge of the desk. The left arm should be placed along but not on the desk, and the left hand on the paper. In holding the pen or pencil the child's first and second fingers should be straight or bent slightly outwards, never rigidly bent in. A slight motion of the pen can then be made without any motion of the hand. The pen or pencil, to encourage finger movements, should be held at least an inch from the point, and should be inclined to the paper at not less than 60°. The child should always be able to see the point of his pen or pencil as he writes."

There are other points with regard to posture that depend upon the itting of the child to his desk.

"The use of slates is inconsistent with correct posture in writing, and is objectionable on other grounds; it should therefore be discontinued.

In many schools children are still compelled to sit in strained attitudes during some part of the school hours. This practice is highly objectionable, and children should never be required to sit with their arms folded behind their backs or over their chests, or with their hands clasped on their heads."

The signs of good health are clearly stated and should help teachers to ›e quick in observation, although this will be of little use unless applica-

tion is made of his knowledge of hygiene, for it is to be feared a very small proportion of town children come up to this standard of good health.

> "*Signs of Good Health.*—Erect carriage and straight limbs will mark normal children who are in robust health. The head will be held well up, the shoulders thrown back, and the feet will rise smartly in walking or running. The limbs and back will be well covered with flesh, the grip will be firm and sustained, and the whole frame will be full of energy.
>
> The skin of the face will be firm, clean, and free from marks, the eyes will be clear but not unduly bright, the hair will be glossy, and in the case of girls will grow copiously. The lips will be a deep pink, the teeth white, and well set, the tongue will be clear, and the mouth will ordinarily be closed and the breathing unimpeded.
>
> The rate of growth will be even and subject to no marked interruption, and the height and weight will be near the average for children of the same sex and age. Boys up to the age of ten will be rather taller than girls, but after that age girls will grow more rapidly for some years.
>
> Healthy children require activity and regular meals during the day and complete rest at night. Up to the age of twelve every child requires at least ten hours of restful sleep out of the twenty-four."

In the chapter on physical education the Board makes the statement that

> ". . . short periods of vigorous movement designed solely to stimulate circulation and respiration should be used as a wholesome means of refreshment for both children and teachers. No special skill on the part of a teacher is necessary for the conduct of exercises of this type, which should be performed several times daily by the children standing up in their places in class."

This suggestion would be good if the exercise were only a source of refreshment, but experience has proved again and again that vigorous exercise, taken under control during fatiguing mental work, and in the crowded, dusty class-room, is a cause of further fatigue, even though it stimulates circulation. If it be a fact that respiration is much stimulated by the exercise, then there is greater danger in deep breathing of the fouled air. One would not recommend vigorous exercise of the lungs while stepping over a drain gully, or passing a dust-cart.

Much greater service would be rendered to the children and no more time occupied, if they were allowed two free recreation periods of ten minutes in the open air instead of one during the long morning sitting; or short periods for free talk between each lesson, which should never exceed forty minutes, even for the elder scholars.

The complete system of physical exercises aimed at for children in the elementary schools is so elaborate that it excludes all who are not well fed, and has to be hedged about with many precautions.

"In order to secure the educational effect of physical training there should be included exercises, like those of balance, which have more special relation to the acquirement of full control over bodily movements. It is to be remembered, however, that when exercises of this class have been so well learnt by practice as to become automatic, their immediate educational value disappears, and the continual addition to the course of further and more difficult exercises is necessary in order to complete the usefulness of physical training.

Every teacher who conducts a complete system of physical training ought to be able to decide what children are plainly unfit, whether by reason of malnutrition or of ill-health arising from other causes, to undertake the full course which normal children can pursue without any risk to health. Other children, in whose general appearance there is nothing to indicate physical unfitness, show symptoms of breathlessness, or excessive fatigue after exercise, and should be excluded from physical training until a medical opinion has been obtained. All teachers ought to be able to decide which children should be excused physical exercises until an expert decision as to their fitness has been given. The physical training of older girls should always be in the hands of women teachers."

The value of good playgrounds and adequate school-room accommo-ation is hinged on to physical exercises instead of on to free play, and ily and hourly healthy life.

"Physical exercises should be practised in every school according to an approved system. The Board recognise that facilities for such instruction do not exist in every school. Not only competent teachers but suitable playgrounds and school-room accommodation are absolutely necessary if physical training is to be thoroughly given."

Nevertheless the chapter contains some simple suggestions, which ight be of service to all if carried out in the spirit of well-played games, stead of compulsory exercises.

"As a condition precedent to good physical development children must not only be well fed, but the functions of nutrition must be well performed, It is, therefore, necessary in the first place to give careful attention to exercises which affect the respiration and circulation. Every system of physical training should therefore make full use of the natural free play movements of children, especially as exhibited in running and skipping games, and should also include breathing and other exercises specially designed to increase the capacity of the chest and strengthen the chest muscles.

A system of physical exercises should aim not merely at improving the physique of scholars. It should tend, in addition, to develop qualities of alertness, decision, and concentration; and should promote the complete co-ordination of the movements of the body under the control of the mind. The latter aim has an immediate connection with the rest of the school work, and in so far as a course carries out that aim it is educational in the best sense."

The questions of mental hygiene touched on by the Suggestions turn n the continued use of the concrete during the whole of the school course,

and the co-ordination of different subjects in the curriculum, to keep the child's attention upon them during the same periods of lesson work, and keep his mind clear as to the relation of one to another; but the Suggestions as to how to do this are rather barren.

> "It is not possible greatly to reduce the number of distinct subjects appearing in the time table; they can, however, be co-ordinated. The formal rules of grammar need not find a place in the time table as a separate subject if correct speaking, reading, and writing are thoroughly taught. History and geography can be taught in connection with each other to a very considerable extent, and the former can be partly taught, and the latter illustrated, from the reading lessons: while the first notions of physical geography can form the subject-matter of observation lessons. Drawing also may be partially taught in relation to other branches of the curriculum. The teaching of physical geography is easier in the country, because the configuration of the land is more easily visible; commercial geography and history are perhaps more easily grasped by town children; while arithmetic can be taught in relation to the work of the farm on the one hand, and to that of the counting house or workshop on the other.
>
> A small modification of the ordinary course of lessons will often be sufficient to secure a wider and more practical instruction, and attention should always be given in this connection to local circumstances and the probable future occupations of the scholars."

But under the heading "Training of the Intellectual Faculties," good advice about mental fatigue is given.

> "The process of teaching involves a careful development of the faculties of the child.
>
> Enforcement of attention and training of memory are among the essentials of education, but attention should be observant and intelligent, and the power of sustained attention is not acquired with ease. Care should be taken lest attention demanded at undue length for one subject lead to weariness, disgust, and waste of time.
>
> As the attention should not be overstrained, so the memory should not be overburdened. A facility in reading and writing should not be regarded as an end in itself, otherwise children assume that reading is a tiresome exercise, and that writing is a form of handicraft valuable only to clerks. The reality of the matter should be brought home to the child's mind that writing is a means for fixing in intelligible language and character the passing thought; that reading is a means of increasing the stock of words at command, of acquiring new ideas about men and things in the present and the past, a resource for leisure, for illness, for old age; an essential not merely to success but to pleasure and interest in life."

Quite a vivid light is thrown upon the moral hygiene of school life, by the suggestions of the influence of the teacher's example on the training of the child. Thus it is not only the ordinary routine duties of action that are enjoined upon the teacher, but even gentle speech, since "the children will imitate what they see and hear."

It would be difficult to estimate the amount of moral reform that would

nsured to the English nation by the introduction of "gentle speech" ›ng the labouring classes and slum-dwellers.

"It is important beyond question that the aim of the teaching should be a high one, but it is even more necessary that school life should prevent scholars from forming bad habits, and, if possible, in good conduct in a wider sense than cheerful observance of school regulations.

In the matter of the moral training of children, a most important factor will be the habitual conduct of the teacher in the school. The example of his patience, kindness, and determination to be obeyed, of his constant watchfulness and scrupulous fairness, will evoke similar traits in his pupils, and will give point and force to formal instruction.

The everyday incidents of school life will enable the teachers to impress upon the scholars the importance of punctuality, of good manners and language, of cleanliness and neatness, of cheerful obedience to dnty, of consideration and respect for others, and of honour and truthfulness in word and act. Children will notice such details in the conduct of a teacher as punctuality, order, neatness, and gentle speech, and they will imitate what they see and hear. They are quick to observe, and if the teacher's conduct is in these respects defective, his example must almost certainly have disastrous effects on the habits of the scholars."

Further suggestions are given as to training the gentle voice in speak- while teaching singing.

"The teaching of singing and the teaching of the mother tongue can be closely associated at more than one point. In the earlier stages training in proper breathing and the accurate production of speech sounds will be as valuable aids to good speaking as they are to sweet singing. A child's speaking voice should indeed be made musical no less than his singing voice. Simultaneous recitation and simultaneous reading aloud are as objectionable on musical as on educational grounds, because the use of such methods is sure to produce reading and recitation which is either frankly unintelligent or marked by a fictitious or imitated intelligence. Such reading or recitation is, therefore, both monotonous and mechanical.

In the highest standards the voices will in cases show signs of beginning to change. Great care must be taken of these voices, and all loud singing prevented.

It is of the utmost importance that little children should be trained to sing sweetly and without strain. Children who cannot sing in tune, or whose ear is otherwise defective, should be made to listen to the singing. These non-singers should be weeded out as early as possible and grouped at the front of the class. Their voices should be tried from time to time, and as their power of singing develops they should be drafted back into the class.

Children who are not taught to use their voices properly are very apt to form the highly injurious habit of using only the lower or 'chest' register of their voices when they sing. If they attempt to sing an ascending scale in this register it will be noticed that their voices break when they reach C or D, and that the rest of the passage will be sung in the 'head' register, which is the true child voice to be cultivated. A short daily practice of a few minutes will be sufficient to secure the use of the proper register if the following rule is attended to. Let the children sing a

note high enough to be out of the 'chest' register (D′, E′ flat, or E′), and then, in the 'head' voice, a descending scale or passage, using the vowel sound of the word 'on,' requiring the use of the 'chest' voice only in the lowest notes, if at all. Quiet and slow practice of a few such passages each day will render the tone of a class pure and beautiful, and will preserve the voices against the time when they break or alter. The teacher should remember that children can sing quietly more easily in the right than in the wrong way."

The gentle speech of a teacher is so closely connected with the esteem in which he is held by the children, that the hygiene of school discipline seems to find its place naturally in this connection; and the modified discipline recommended by the Board of Education shows what they consider may be effected by more rational and life-like teaching, associated with more cultured and less harassed and overworked teachers.

"With many children the reproof of a teacher whom they esteem is in itself a punishment which makes positive penalties unnecessary; with others the most sympathetic teacher may find that punishment in some shape or other must be resorted to. When it is necessary to punish a scholar for faulty schoolwork or for breaches of school rules, the principal object should be the benefit of the scholar, though the vindication of school discipline is often necessary in difficult cases. The penalty assigned must therefore be just, that is, it must be a reasonable and natural consequence of the fault in the case of the particular child. For example, faults due to carelessness or wilfulness may merit a punishment which is not deserved if the same faults arise from that slowness of mental development which may often appear in children from poor homes. If the bodies of such children are not actually ill-nourished, their intellectual development is often retarded by uncongenial surroundings. The punishment of such children for faults of school-work is a matter which calls for the exercise of judgment.

Efficient discipline under favourable conditions would form those good habits which make punishment unnecessary; the undue frequency of punishment indicates faults in the teaching as surely as in the children. Order, diligence, and obedience, if secured only by means of punishments, do not constitute good discipline; and whether maintained by fear of punishment, a discipline which places children under constraint is incompatible with the best kind of teaching. In no case should infants be punished by the infliction of bodily pain, nor should girls be subjected to corporal punishment unless in exceptional cases, and then if possible at the hands of a woman teacher."

The chapter on the use of examinations discusses the question altogether apart from the hygiene point of view, and shows a want of any hygienic conscience at all, in conducting what are understood as examinations. The "Suggestions" are, of course, right in saying that

". . . Examinations are at best a concession to the weakness of the human memory and understanding. If everything that we learned was immediately assimilated, placed in its right relations to the rest of our knowledge and never forgotten, the purpose of examinations would be gone.

> Furthermore, examinations conducted by external authorities are an interruption to continuous school work: unless they are most intimately related to the work which has been done both in and out of the class they have a tendency to divert the scholar, not merely from discursive and aimless wanderings in the field of knowledge, but from all study but such as can be reproduced in competitive display: and they encourage a knack of presenting knowledge in compact and handy forms which tends to make the scholar forget or disparage the larger purposes of study."

It is also true that examination is an essential part of teaching, and ed only as a part of teaching, the continual use of examinational ethods as helps to the assimilation of knowledge and the associating of w material with old material would meet with the approval of the 'gienist both as physically and mentally healthy, and the following atement would be endorsed:—

> "Neither teacher nor pupil should regard examination as an end in itself, although, if properly used, examination is an essential part of teaching."

But it is not this healthy mental work that is meant in the following ragraph, which refers distinctly to terminal examination; oral in the wer classes and written in the upper.

> "Examinations, however, even when conducted by the teacher, should not be frequent. In no case should they be held more often than four times a year: and in schools whose size or organisation allows the Head-Teacher constantly to supervise the work of his staff, two formal examinations in the year are often sufficient."

There is need for more attention yet from the hygienic world to the iestions of examinations and evening lessons, if the new spurt towards a ore rational education is to have full effect on the health and well being the masses. The educationalists, who have already been looking to The oyal Sanitary Institute leading the way in hygienic reform in matters of hool sanitation and physical culture, ought not to be disappointed of help carrying out the larger hygienic movements of retaining the healthy ind and gentle manners which are the highest outcome of real culture; iese should be as truly striven for as a result of elementary education i of university life.

NOTES FROM THE REPORTS OF THE MEDICAL OFFICERS OF HEALTH.

ILLNESS FROM ANILINE OIL.

Extract from the Report of the Medical Officer of Health for Stockport for 1904,
MEREDITH YOUNG, M.D., D.P.H.

My attention has recently been drawn to several cases of illness resulting from the use of a marking ink solvent used in certain laundries. I obtained a sample of this through the courtesy of a local medical practitioner who had been called in to attend these cases, and submitted it to the analyst, who declared it to be commercial aniline oil. I interviewed the Factory Inspector and obtained some further information as to the extent to which this was used, with the result that in the end I forwarded a letter to all the principal laundries in the town, drawing their attention to the dangers attending the careless use of this solvent, pointing out the symptoms which would be likely to result from poisoning caused by it, and informing them of the precautions to be taken to avoid danger, and the means to be taken in the event of illness resulting.

BLACK SMOKE.

According to Dr. Meredith Young, the most commonly-used appliances in Stockport for the prevention of smoke are Green's economisers, Procter's mechanical stokers, Binnie's mechanical stoker, several forms of hollow bars, and certain automatic air regulators.

OBITUARY.

ALFRED WATERHOUSE, R.A.

(VICE-PRESIDENT.)

We greatly regret to have to record the death, after a long illness, of Mr. Alfred Waterhouse, F.R.I.B.A., R.A., LL.D., who occupied the post of Vice-President of this Institute since 1888, and was Vice-President of the Parkes Museum from 1885–88. He passed away on the 22nd ult. at the age of 75, at his country residence, Yattendon Court, near Newbury, Berks, where he was lord of the manor, patron of the living, and a large land owner. Born in Liverpool in 1830, he began practice in Manchester in 1853. He was elected a Fellow of the Royal Institute of British Architects in 1861, and served as President during the three years 1888–91. In 1878 he received the gold medal annually awarded by the Sovereign (under the recommendation of the Institute), and in the same year he was elected Associate of the Royal Academy, and in 1885, Royal Academician.

Mr. Waterhouse became a member of the Architectural Association in 1866. In 1867 he won the "Grand Prix" for Architecture at the Paris Exhibition, an honour followed by that of a "Rappel" at the Exhibition of 1878. For the Paris Exhibition of 1889 he was appointed an International Juror in the section of Architecture; in 1900 he was appointed one of the Fine Arts Committee of the Royal Commission for the Paris Exhibition.

He was elected a member of the Royal and Imperial Academy, Vienna, in 1869; was an Associate of the Académie Royale des Sciences, des Lettres, et des Beaux-Arts de Belgique; and member of the Royal Academies of Arts at Brussels, Antwerp, Berlin, and Milan; he was also Correspondant de l'Académie des Beaux-Arts, Institut de France. He served as a member of the Organising Committee for the Imperial Institute and of the Westminster Abbey Commission. In 1895 he received the honorary degree of LL.D., Victoria University.

By the death of Mr. Waterhouse the Architectural Profession has lost one of its most successful and distinguished practitioners. His career has been one of marvellous activity, and the record of his executed works, as

noted in the professional journals, is a surprisingly comprehensive list of works carried out by any single architect. His first work of considerable importance was his design for the Manchester Assize Courts, which at once brought him into notice as an architect of great power and originality of expression. He also designed and carried out the new Town Hall for the same city, which is looked upon as perhaps the most typical of his architectural style. Both these successes were gained in keen competition with his brother architects. His numerous works all over the country, consisting of town halls, colleges, country houses, hospitals, and almost every form of building, constitute a record of practice which has been equalled by few modern architects.

To great professional ability, Mr. Waterhouse joined a resolute purpose and a charm of manner which deservedly gained him the confidence and esteem of all with whom he was associated.

The funeral took place on August 28th, in the churchyard of Yattendon, about six miles from Pangbourne, when a numerous company of relatives and friends from all parts of the country assembled at the graveside. The coffin was borne on a hand-bier by the Estate workmen from Yattendon Court. Besides the members of the family and near relatives and friends, the funeral was attended by past and present members of Mr. Waterhouse's architectural staff, Mr. Alexander Graham and Mr. R. S. Balfour (representing the Royal Institute of British Architects), Professor Elsey Smith and Mr. Driver (representing the Architectural Association), and Mr. Thomas W. Cutler (representing The Royal Sanitary Institute).

T. W. C.

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JOURNAL
OF
THE ROYAL SANITARY INSTITUTE

HOSPITAL FOR INFECTIOUS DISEASES, NEWBURN.

ADDRESS

By
His Grace the DUKE OF NORTHUMBERLAND, K.G.,
Chairman of Northumberland County Council.
(PRESIDENT R. SAN. I.)

ON this occasion of the opening of a new Hospital for Infectious Diseases, I may well congratulate the Committee of Newburn, Gosforth, and Castle Ward upon having taken advantage of the opportunity afforded to them by the County Council to erect so admirable a building; and also upon having achieved what appears in some quarters to be a rather difficult process: that of uniting various local bodies for one common end. Every case, of course, must stand upon its own merits, but I am certain, in the majority of instances, economy and efficiency will be secured by local authorities joining their forces for such objects so far as they can. In erecting this hospital it was necessary to face the fact that it is an institution which will always be required. In spite of the advance of sanitary science, we are as far off as ever from being able to stamp out any of those infectious diseases for which an institution like this is provided. I do not feel the same about smallpox, because I am one of those old-fashioned people who believe that if the population were thoroughly vaccinated and revaccinated, no smallpox hospitals would be required. That has been the experience of Germany, and there is no reason why our experience in England should not be the same. Therefore, I look upon a smallpox hospital as more or less of an extravagance; one, we must admit,

that is absolutely necessary until we can persuade the population of this country to adopt the proper means for practically doing away with smallpox altogether. But, as it is within the power of medicine to do that, I hope the day may come when we shall look back upon smallpox hospitals as very antiquated and inefficient expedients. This, however, will not be the case with the ordinary infectious hospitals. We shall from time to time be exposed to epidemics, and must face them. We may hope that institutions of this description will hinder the spread of epidemics, but particularly that they will prevent infectious diseases, especially scarlet fever, being what they too often are now, endemic and constantly present in our midst. Their influence, combined with other sanitary measures, may also arrest the spread of typhoid fever, which is, or ought to be, an entirely preventable disease. I have, however, to condole with you, as well as to congratulate you, because you will have to pay the expenses of this institution out of the rates. No ratepayer looks with pleasure upon any increase of local taxation, and as Chairman of that much-abused body, the Northumberland County Council, I feel that I come before you somewhat in the light of a culprit in inaugurating any step which involves an addition to the rates.

I do not know whether or not you wish me to take this opportunity of saying anything in defence of the body over which I have the honour to preside. If I do I should say this: That so far as my experience goes, all representative institutions are very feeble instruments for promoting thrift. From the House of Commons down to the Parish Council, they are all expensive luxuries. They may have many merits, but they have not that of being in their nature economical, because you have a large number of people who represent a still larger number of people, all of whom think, very rightly and properly, that they ought to be fully informed upon the business transacted by their representatives. This leads to a great deal of printing, tabulating, and clerical work, all entailing expense. This is a new burden, imposed upon the country within the last twenty years. In addition, one of the effects of representative institutions like county councils is that there is a constant temptation to Parliament to get over the difficulties of settling the details of measures and the machinery by which those measures should be carried out, by transferring that duty to local authorities. The consequence is that, year after year, more and more business is imposed on these authorities, entailing increased expenditure. So far I am willing to agree with you that the county council is a costly thing, but I am not prepared to admit that we have

not done all we can to reduce expenditure to as low a point as possible, compatible with efficiency. I should be very glad (and I am sure I am speaking for every member of the Council when I say it) if our friends would not be content with merely complaining that the rates are going up (which we all agree is a very great evil) but would also tell us how to keep them down. We all regret extremely any additional burden put upon the rates, but I am bound to say that, so far as this hospital is concerned, considering the very large amount of accommodation afforded, and the very efficient provision made for meeting the requirements of an institution of this kind, you have got off fairly cheaply. That is largely due to the energy and forethought of the committee who had charge of the designs, and to the skill of the architect.

Before closing these remarks, I should like to say one word in regard to what has been said of the unwillingness of patients and others to avail themselves of an institution of this kind. In all cases where we come between parent and child great consideration should be shown. It must be remembered that, theoretically and naturally, the parents are the proper persons to educate, clothe, feed, and nurse their offspring. In a complex state of society we find it necessary to intervene between parents and their children, and consequently we have already got as far as compulsory education and compulsory notification of infectious diseases. But we must always remember that such interference is only justified by the necessities of an advanced civilization in a redundant population, and is, to a certain extent, contrary to the inherent and justifiable instincts of those with whom we have to deal.

So far as compulsory education is concerned, I believe its not having been more successful than it has been may possibly be due to the fact that parents, resenting instinctively and unconsciously, perhaps, the interference of the State, have not co-operated as they might otherwise have done. On the other hand, some success has been achieved on the whole, because parents are anxious that their children shall receive a degree of education they are themselves incapable of affording to them; and therefore they have, possibly also unconsciously, been willing that those in authority should use the power entrusted to them to enforce education upon them. So it will be with infectious hospitals. If we could get parents to see that their children are better cared for there than they can be at home, they might be more willing to forego that which is the natural right of all parents, the nursing of their own children. But we must convince them that it is for the benefit of the children.

This, of course, is not the only object of infectious hospitals. They are not for the benefit of the patients alone, but are also for that of the public. But I am afraid the parent, when the child is ill, cares remarkably little for the welfare of the public as compared with that of the child. Therefore, it is absolutely necessary we should convince the parent that it is to the interest of the child that it should be taken from its home and put into an institution of this kind. So far as I can judge, the committee, in the arrangement of the hospital, have spared no effort to secure this end. If anybody is inclined to say that they have gone further than was absolutely necessary in this direction, their justification is that it was essential to show parents that they were willing to afford every facility for the cure and comfort of the patient that science, skill, and care could devise.

THE PUBLIC HEALTH.

(Being the Lecture delivered to the Faculty of Medicine at the Opening of the Winter Session at University College.)

By HENRY R. KENWOOD, M.B., D.P.H.,
Professor of Public Health, University College, London;
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(FELLOW.)

THE object of medicine is to prevent or to cure disease, and the medicine of the future will be increasingly exercised in the direction of keeping patients in health rather than of prescribing for them in sickness. For this and other reasons a medical man must be well informed upon matters affecting personal and public health. Thanks to the press, public health problems are now discussed with intelligence by the man in the street, and the last one who can afford to ignore every opportunity of keeping *au courant* with them is the medical man. He owes it to the community to advance the general health, and he can best promote this useful mission by helping to disseminate the knowledge of which the masses stand so much in need before many necessary advances can be made. Even nowadays he is frequently consulted with reference to the very latest scientific advance in public health and hygiene, and his lot in the future will be more exacting still. I would strongly emphasise the fact that if a sufficiency of this knowledge is to be acquired by future practitioners, it is necessary that they shall take greater advantage of the facilities which already exist in the medical schools for the teaching of hygiene and public health.

Opportunities for good work and fair remuneration are afforded to those who enter the public health service, and the practical application (and may be initiation) of measures designed in the interest of the public health is an attractive and beneficent work of great national importance, for *salus populi lex suprema* is an old and true adage. Imagine, if you can, a greater stimulus for work than the following reflection:—If by our exertions we can confer benefits upon those who live, our work will echo down the ages to the advantage of generations who have yet to live, and

the aggregate of life thereby saved may equal or even exceed all the life that now is. But owing to the paucity of endowments we have not in Great Britain a sufficient number of workers engaged upon this task of research in sanitary science, and there remain many fields of inquiry which when diligently cultivated will yield a rich harvest—for the devising of practical measures of public health is still hampered in many directions by the imperfections of our knowledge. Surely if there are those prepared to devote their time, ability, and energies to work of such national importance, those who are favoured with this world's riches might be expected to come to their aid and make more of such work possible.

Since the science of public health concerns itself with healthy being and embraces everything which bears upon the nature and causation of disease, the real task of hygiene is to teach men how to live and be healthy under the conditions which social and economical interests impose, and (if necessary) to devise practicable means of modifying adverse circumstances. If nowadays a thoroughly enlightened sanitarian were to emulate the example of the late Sir Benjamin Ward Richardson and put on record his conception of what ought to be in *his* model city of Hygeia, I venture to assert that a marked difference of treatment would be discernible. The late Sir Benjamin Ward Richardson's ideals related rather too exclusively to sanitation as applied more directly to sanitary environment and he paid insufficient regard to the claims of the individual. Environment counts for much, but in this country it has received in the past a disproportionate share of our consideration and administrative energy. The quantity which determines the survival of an organism is the ratio of its fitness to the strain imposed upon it by its environment, and public health policy yields the best results, in the aggregate, when it is directed towards increasing the fitness of the individual to withstand this strain; in other words, while sanitary improvements of dwellings and surroundings do much to better the outward circumstances of the people, they can make but little amends for faulty habits of life. It certainly was essential that the individual should adopt a satisfactory standard of healthy and decent living if the utopian death-rate of 5 per 1,000 was ever to be realised even in Hygeia; for the attainment of sound moral and physical health (the *mens sana in corpore sano*) demands more than is implied in the term sanitation. The habits of self-denial and self-respect are essential.

By the development of a sanitary conscience in the community, and thus by a general diminution of the favourable conditions of environment under which specific organisms thrive, and by an extended use of protective agencies, we should gradually reduce and finally wipe out much of the

communicable disease of the present day. This conception has already been partially realised in the past under altered conditions which for the most part we do not understand, but which have operated in the direction I have indicated.

Typhus has been practically exterminated from our midst during comparatively recent years, the necessary environment having been rendered uncongenial mainly by our altered conditions of living. The mortality from scarlet fever, owing to a remarkable natural attenuation of the virus of this disease, has fallen over 80 per cent. during the past thirty years, (in this connection it is a noteworthy and remarkable circumstance that whereas thirty years ago measles occasioned only half the mortality of scarlet fever, it now causes three times the death-rate from that disease). The mortality from enteric fever has been reduced 50 per cent. during the same periods; and although history reminds us of the occurrence of cyclical variations in the virulence of certain diseases, more especially of scarlet fever, there are good grounds for hope that the diminished virulence now to be noted in several communicable diseases is of a permanent nature.

Measles and whooping-cough, it is true, continue to exact a toll of suffering and death which is now but little less than in former years, but they offer very special difficulties of control, and the circumstances favouring their spread have multiplied enormously during recent years. The opportunities afforded by the aggregation in school classrooms for the spread of infectious disease among those of the most susceptible age-periods, and the overcrowding in our large urban communities, are mainly responsible for the fact that diphtheria, scarlet fever, measles, and whooping-cough (all diseases which often remain unrecognised) are as prevalent as they are. It seems that no powers or resources at present possessed by sanitary authorities suffice to secure that large measure of control that is necessary to check the spread of measles and whooping-cough. It is a matter of supreme difficulty to ward off attacks, but the future is sure to see a great reduction in *mortality* from these diseases. That the mortality is largely preventable is shown by the circumstance that it is always very largely borne by the poor. It is a mortality due in no small measure to parental ignorance, and the only remedy for that is the better education of the masses on subjects of vital importance.

Bacteriology has already built up a record which amply warrants the view that it is destined to become in the not very distant future a tremendous force in preventive medicine. That much of the most recent work has been of a nature to question or to discount the value of antecedent work (and the somewhat dogmatic conclusions based upon it) is

due to the fact that the science is as yet in its infancy. At the present time it is yielding excellent services by assisting in the diagnosis and cure of, and by furnishing the means of immunisation from, specific diseases; by making possible the rational selection and employment of disinfecting agents; by indicating the modes of conveyance of infection; and by aiding in the detection of dangerous forms of pollution in food and drink. In the course of time our knowledge will be extended in each of these respects, and the era will set in when every sanitary authority will regard its own well-equipped bacteriological laboratory, directed by a medical man well skilled in the science, as the mainspring of its clockwork public health administration; when all but the conscientious objectors will avail themselves of a preventive inoculation for the production of immunity against the specific infection from which they would protect themselves; and when curative inoculations of anti-toxic sera, such as have already been prepared and used for inoculation with beneficial results in diphtheria, tetanus, septicæmia, and puerperal fever, will be acknowledged by every practitioner to be the most potent and satisfactory drugs for the cure of infectious disease in his pharmacopœia. The triumphs of the anti-toxin treatment of diphtheria are now universally recognized, and the results of the treatment in the large fever hospitals of the metropolis are a striking testimony to its value. In these hospitals the case-mortality amongst the diphtheria patients, which in 1893 (the year before the disease was treated with anti-toxin) was 30·4 per cent., was last year only one third of that figure. While doubtless there has been some slight attenuation in the virulence of diphtheria during recent years, the beneficent effect of the administration of anti-toxin can alone be responsible for *the bulk* of this wonderful improvement in the short space of eleven years.

It is commonly stated that the practice of hygiene and preventive medicine tends to the preservation of the physically unfit, who would otherwise naturally fall victims to the law of the survival of the fittest. But there is doubtless both a credit and a debit side to the account, and there can be little doubt that the credit side presents a splendid balance. It must be conceded that some weaklings are permitted to survive, and, unfortunately, this circumstance affords them an increased opportunity for the transmission of their unfitness to future generations. But the same conditions which strengthen the weakest make also for the survival of the fittest, by increasing the virility of the naturally virile and tending to maintain the stock in a healthy condition. Preventable disease, moreover, often subtracts from the sum of the vigorous and adds them to the sum of the relatively inefficient; for it must not be forgotten that many forms of

preventable disease are indiscriminate in attack, and often strike down the strongest of the community. If then many members are left weak by the passing shadow of disease, and if hygienic measures, while raising above the line of viability a few degenerates, raise the whole of the community to a corresponding degree in the scale of good health, who shall measure the enormous gain; and who shall question the value of the labours of the sanitary reformer?

While during the last thirty years the population of England and Wales has increased by 10,000,000, the gross mortality is less now than it was then; and public health policy has not only neutralised the increase in the death-rate, which, through increasing urbanisation, would otherwise certainly have occurred, but it has secured a considerable balance on the right side. That the sanitary condition of this country has undergone a marked improvement since 1875 is incontrovertible, and the gains are well summarised in the Report of the Committee on Physical Deterioration. "Testimony is almost unanimous as to the improving conditions under which the denizens of large towns are called upon to exist. Rookeries are being dispersed; enclosed yards opened out; cellar dwellings and back-to-back houses are disappearing. One-roomed, two-roomed, and three-roomed tenements, with more than two, four, and six occupants respectively, are diminishing. . . . . Further, the water supply has been enormously improved both in purity and quantity; legislation has greatly extended the liabilities of owners and occupiers under the Public Health Acts and the Housing Acts, and under the said series of Acts wide powers have been placed in the hands of local authorities for cleansing unhealthy areas, closing insanitary houses, preventing overcrowding, abating nuisances, and enforcing generally a higher standard of sanitation. Machinery exists for the inspection and purification of cowsheds and dairies; pauperism has diminished; better and more complete accommodation is provided for the sick poor; the conditions of labour touching young persons and women in factories and workshops have been greatly ameliorated; and all the children of the State in workhouse schools, reformatories, and industrial institutions are started in life under far better auspices than formerly."

But the fact that, whereas during the past fifty years the general death-rate has fallen some 26 per cent. and some millions of lives have been saved, the infant population has not shared in this reduction even to the extent of 1 per cent., is a serious matter for reflection; and when it is considered in conjunction with the circumstance that the birth-rate has declined over 17 per cent. during the same period (a decline which during recent years has been at a greater rate than that of any other

European country), it becomes a matter for grave national concern. If the fall in the birth-rate of our nation is to continue, as there is little doubt that it will do, it is essential for our national vitality to curtail the heavy expenditure of infant life.

Among infants in both urban and rural counties there has been a marked increase in the deaths from gastro-intestinal maladies and premature birth, and these and other influences have counteracted the benefits to the infant population of the generally improved sanitary conditions of the people, and the fruits of over a quarter of a century of compulsory education. This excessive infant mortality is confined to the poorer classes, and it is the result of many forces, some of which are very complex; but the main factors are:—the employment away from home of those about to become mothers, and of those recently confined who should be nourishing their infants, the infants being badly cared for and ill-fed while those mothers are at work; and the greater ignorance among women as to feeding, clothing, and managing of infants. This maternal ignorance and neglect offends against every law of hygiene, and is responsible for the fact that approximately one out of every six children born fails to complete its first year of life. The mean rate for the past five years of infant mortality during the first year of life, exceeds 200 among every 1,000 births in some of our large industrial centres, and one shudders when one contemplates what this rate would be if it were drawn out for small slum areas and not taken for the whole city, including the rich and the poor, the wise and the ignorant, the careful and the indifferent. If the share of this death-rate which is due to ignorance, indifference, and neglect could be computed, it would probably exceed 100.

The domestic life in our midst is not now what it was, and compulsory school attendance and early female employment away from home have done away with much of the home education of the child-nurse. Much of the precious influences and associations of the family and the home seem to have been lost. This is deplorable, for a child who has never known proper home-life and motherly solicitude, has been deprived of that for which nothing in after-life can make amends. Although it is probably true that fewer present-day mothers are able to perform their maternal vocation of suckling their offspring than formerly, it is equally true that a large number deprive the infants of their natural food through selfishness, laziness, and indifference; and for pleasure and self-enjoyment many of the rich and poor alike are ready to sacrifice maternal aspirations and to subordinate maternal instincts.

Diarrhœal diseases and deaths from defective nutrition are always

truly referred to as the chief dangers to which hand-fed children are exposed, and this fact emphasises the argument against rearing a child by hand except in cases of absolute necessity. The proportion of hand-fed children to those who are suckled increases yearly, and everywhere the same testimony is forthcoming that children fed naturally from the breast have a prospect in life far in excess of those who are fed artificially. Even under the most favourable conditions the substitution for the infant's natural food of an artificial diet is disadvantageous, but when we find the mother's milk is very often substituted by such products as cheap brands of condensed milk and of artificial foods, administered by those who have little knowledge of the infant's requirements and none of the composition of the stuffs they are giving it, how can we hope to avert the Nemesis of much preventable sickness and death? But it is not only in the actual number of deaths that one sees the evil of this state of things reflected. One has to think of the far greater number of infants who escape death, but grow up with constitutions permanently damaged. Now I do not propose on this occasion to discuss the many remedies which have been advocated and adopted to check this slaughter of the innocents, but it is obvious that there are two main directions in which we must seek our remedy. We must get in touch with the mothers of to-day after the baby has made its appearance, guide and help them, and we must educate the mothers of the future while they are under our control at school, and while their minds are plastic and receptive. We must advocate breast-feeding, especially among the poor (and we need not remind them of the bad example which their better-educated and happier-circumstanced sisters in the higher classes set them). Failing breast-feeding, the only substitute is fresh cow's milk treated so as to resemble human milk as much as possible, and stored and administered under conditions of scrupulous cleanliness. For the neglect of these simple precautions, the infants of these islands are paying an annual toll of many thousands of deaths. The other remedies suggested and adopted to reduce this wastage of human life are numerous and manifold. Many are designed rather as palliatives of symptoms than as radical cures. Subsidiary measures to be discarded when better methods become practicable are the municipal milk depots and crêches. These have doubtless a great educative value, and the provision of the latter in most urban districts is becoming increasingly necessary now that education authorities are beginning to recognise that evils of a public health nature and the cost entailed outweigh the educational benefits to be derived from admitting babies to school under the age of five. If the poorer mothers of England

were all free to give the proper attention to their children, and if they were all educated to a proper performance of their maternal duties, a crêche might be held to do more harm than good by weakening parental responsibility. Let us hope that in time crêches may become unnecessary; but at the present pass at which we have arrived they are desirable, and they may be used with advantage in the education and training of the children who are to become the future mothers.

The distribution of clean milk from a municipal depot, in clean bottles which only hold sufficient for the child's meal and from which the child is directly fed, is a useful measure under existing circumstances, because the milk purchased at the door is generally dirty and the risks of home contamination are so great; but the measure is essentially a palliative one and must be regarded as only provisional. The radical cure is to be found in clean cows, clean cowsheds, cleanly milking and transit, and clean storage in the house. A pure milk supply is at the present day one of the greatest sanitary needs of the country, and if we can teach the masses the great importance of keeping the milk clean after it arrives in the homes many hundreds of infant lives will be saved each year. It is certain that if the educated section of the public were familiar with the conditions under which most of the milk is drawn in rural districts, it would not be long before they strengthened the hands of those who do know, and demanded an improvement.

In this country public health authorities are increasingly recognising the value of the services of female sanitary inspectors or health visitors. Voluntary lady health missioners are now in many districts helping to stem the tide of infantile mortality. I have myself succeeded in organising such a body in Stoke Newington. Their main duty is to visit the poorer houses when babies are born, to show a tactful interest in the child and to guide the mother in the care, feeding, and management of the infant. The medical profession itself can also do much more in the the future than it has done in the past, towards overcoming the ignorance which exists as to infant feeding and management; for I fear many medical men bring children into the world without giving any directions for their future welfare. A medical man attending a confinement has not completed his duty, either to the patient or to the State, when he has safely delivered the patient and handed over the child to the nurse. Detailed instructions should always be given as to the feeding and management of the infant.

I cannot leave this important subject of child-nurture without some brief reference to the evil consequence of the prevailing ignorance upon

the important subjects of the selection and cooking of food. It is responsible for much waste of food and money, and the population pays a heavy penalty in poor health and physical development. When the great economical interests at stake are considered, it is remarkable that no greater effort has been made to counteract it. Nowhere has this fact been more strongly exemplified than by the work of Mr. William Hall. He found that at Leeds, when comparison was made of some 3,000 children similarly circumstanced as to poverty and residence, a marked inequality in physical development of Jewish and non-Jewish children. The poor Jew was 3 pounds heavier and 2 inches taller than his non-Jewish brother at the age of 8 years: $6\frac{1}{2}$ pounds and $2\frac{1}{2}$ inches at the age of 10; and at the age of 12 he was 7 pounds heavier and $1\frac{1}{4}$ in. taller. Bone formation was much more satisfactory in the case of the Jew, the teeth were very much better, and there was a striking absence of rickets; the nasal chamber was large, the palate was, as a rule, large and flat, and the children were remarkably free from adenoids and were nose breathers. In all these particulars the non-Jewish child of the same age was decidedly a sufferer by the comparison. He attributes these great variations to the difference in feeding: *a difference which does not necessarily entail a greater expenditure of money.* Now if this state of things can be remedied we shall hear less of the lamentable fact of children being sent to school in a half-starved condition. The attempt to educate half-starved children is not only an unprofitable outlay of public funds, it is a cruelty to the children. If some of the necessary outlay, entailed by the provision of one good meal to the happily small percentage of those children who require it, can be recovered from the parents, it is a public duty to collect it; and it will lighten the public burden and impress parental responsibility. But whatever happens, the children must be fed, and if private philanthropy does not suffice, the public purse must, alas, be still further drawn upon.

The need of bodily health as the foundation of sound mental work is generally recognised, and the careful consideration and scientific and practical application of health conditions in all arrangements connected with education and school life, is of vital importance to the effective well-being and progress of the nation. The cultivation of child-life at school ages is a highly artificial process, for which Nature has made no special provision; and which, in fact, must even under the best conditions be carried on to some extent in actual defiance of her laws; and much remains to be done if the evil consequences which too often result are to be reduced to the absolute minimum. The six-year-old child, with his left ear on the desk,

strenuously rendering himself myopic by a steady glare at a pen-point wobbling in response to the clumsiness of his feebly-controllable hand-muscles, will then be no longer a common object of the schoolroom; and better ventilation and more cubic space in the classrooms will produce a more healthy and a more mentally-alert body of scholars. If much preventable disease is to be prevented, and if easily-curable conditions which determine so much the physical and mental well-being of the individual in after years are to be nipped in the bud, we must have medical inspection of all scholars at the commencement of their school career and repeated medical inspection during the continuance of it. Much educational energy is at present misspent; and the nation should, moreover, appreciate the economical advantage of insuring that all those who are being taught, at an enormous expense to the country, are made and kept as fit as possible to receive the maximum benefit from that education. The need for medical inspection of school children has been abundantly testified by the work undertaken in this connection in other countries. The results, of course, vary in the schools inspected: from 10 per cent. of children requiring medical help in better-class, to as many as 50 per cent. in schools drawing their scholars from the slums of large cities. It is a national shame and reproach that we threaten to be one of the last among civilised nations to undertake this obvious duty. I care not what excuses are advanced or what difficulties are imagined, they may all be met by one unanswerable retort: that what is found to be easily practicable in Germany, Japan, and elsewhere, is practicable in our own country.

The hygienic reform of the future will depend almost entirely for its success on the proper education of the people. We are all too painfully aware of the large amount of wasted energy and life which results from ignorance and neglect of the laws of health, and which, apart from the misery it entails, constitutes itself such a heavy economical loss to the State; and there can be no gainsaying that the ignorance among the poor of household management and of the elementary principles of hygiene, is responsible in no small measure for their high preventable mortality, their poor physique, their intemperance, and their poverty. The possession of citizens of good moral and physical stamina is the most valuable and abiding of all national assets, and for this the nation is largely dependent upon what the educational influences of school life are made to be. Despite overcrowding and structural defects in so many of the tenements occupied by the poor, if those who occupied them had only been trained to observe cleanly habits and to recognise the importance of fresh air, how enormously these people would benefit. There is much to be

said against the negative results of an education in which girls are largely separated from domestic influences and experience during the most impressionable years of life, and there is no doubt that the elementary facts of cooking and of infant management and feeding should be taught to every female child. The feeble efforts in these directions which have already been made have mostly failed on account of the unreality and incompetence of the teaching. Herbert Spencer's disputation of our educational aims, written many years ago, applies with equal force to-day.

> "If by some strange chance not a vestige of us descended to the remote future save a pile of our school-books or some college examination papers, we may imagine how puzzled an antiquary of the period would be on finding in them no sign that the learners were ever likely to be parents. 'This must have been the curriculum for the celibates,' we may fancy him concluding. 'I perceive here an elaborate preparation for many things, especially for reading the books of extinct nations and co-existing nations (from which it seems clear that these people had very little worth reading in their tongue), but I find no reference whatever to the bringing up of children. They could not have been so absurd as to omit all training for this gravest of responsibilities. Evidently this was the school course of one of their monastic orders.'"

During the past sixty years there has been a reduction of some 66 per cent. in the deaths attributed to phthisis, and 40 per cent. of this diminution has taken place as recently as the last thirty years. Of the deaths registered thirty years ago, a fraction over 1 in 10 were attributed to phthisis, whereas the ratio is now 1 in 13. But even at the present time it is estimated that about a quarter of a million persons are suffering from this disease; and the mortality exceeds 40,000 individuals every year in England and Wales. Consumption claims its victims mainly from the effective population, the bread-winners. Of males between 20 and 50 years of age it slays annually in England and Wales some 17,000, and on an average each death has been preceded by three years of sickness. It is easy then to see why this disease is one of the leading causes of pauperism. On the estimate made by the late Dr. Farr of the monetary value of human life to the State, these 17,000 male deaths alone would represent an annual national loss of between three and four millions of pounds sterling. If there had been no consumption the average length of life for each individual born would have been lengthened by two and a half years, and the working period of life would be increased on the average by very nearly two years. All will agree that the measures designed by sanitary authorities for the prevention and relief of phthisis can only be regarded as complete when they are carried with certainty and promptitude to those who more particularly stand in need of them, and the initiated recognise

that the measures at present adopted do not reach that desirable standard. It is necessary to know early where all the infected homes are, and this information can alone be obtained by compulsory notification of the disease.

At the present time we are disposed to overrate the value of sanatoriums and we are constructing and equipping them on extravagant and faddy lines. It must be borne in mind that without sanatoriums, phthisis has been reduced in this country some 66 per cent. during the past sixty years, and efforts to still further improve the adverse conditions under which so many of the community are compelled to live and work, and to reduce the death-rate due to ignorance, will achieve the best results; moreover, they possess the advantage of at the same time shrinking the wastage from many other preventable diseases. Institutions are also wanted which are not provided primarily for the benefit of the patient, but for the isolation of the patient for the benefit of others, and which may therefore be fairly supported out of the public funds. There are no such institutions in London, if we exclude the inadequate provision for phthisical paupers, and until they are provided we lack one of the essential provisions for coping with the disease. But whatever the extent of the provision made in a sanatorium or isolation hospital, the great majority of the sufferers from phthisis would remain outside with their families and at their work until the latest stages of the disease are reached, rather than enter an institution for several months. The use of sanatoriums for educational purposes has therefore much to recommend it. Even a short sojourn will often suffice to habituate the sufferers to the proper mode of procedure, so that when they return to their homes they are trained to practice the habits of educated cleanliness, and so the dangers of spreading the disease are much reduced. Consumption, then, must be variously dealt with in its different stages. In the earlier stages what is wanted is education and open-air treatment for those able and willing to avail themselves of it. The advice to a consumptive that he should keep his mouth shut and the window open, is of that simple and concise nature that appeals, and it is sound. That even the general public has taken this salutary advice to heart is evidenced by the larger number of open windows nowadays to be observed, and the great reduction in the dangerous and disgusting habit of spitting everywhere. In the latter stages isolation is needed, for every word that the patient speaks and every cough is the cause of the dissemination of the tubercle bacillus, and then, whatever instruction has been given to the patient in the sanatorium, nothing can prevent him from being a source of danger to all about him. Above all we must aim at raising the general standard of healthy living, because in

the low standard of domestic and personal hygiene, and in overcrowding and bad sanitation, we have the conditions which favour the disease. The importance of a careful selection of occupation for those who inherit a predisposition to phthisis and, where practicable, for those who are discharged from sanatoriums, cannot be exaggerated; and since, otherwise, work has often to be persisted in by a phthisical patient to the detriment of his own recovery and the safety of his fellow-workers, the German measure of compulsory insurance has much to recommend it. In Germany at present all persons, male and female, engaged for wages or salary in trade or business (excluding domestic servants and agricultural labourers), are compulsorily insured against sickness and death, the employer paying one-third, and the employee the remaining two-thirds of the premium. In this as in some other respects a comparison with Continental methods is not to our advantage.

We all hope that the efforts being made in this and other countries will soon lift the veil which hides the secret of that terrible disease, cancer. The difficulties of diagnosis and the faulty certification of mortality have combined to vitiate the statistics of this malady to such an extent that it is dangerous to base conclusions upon them, but personally I find it difficult to believe that some of the steadily progressive increase indicated in even the last few Annual Reports of the Registrar-General, can be explained by better diagnosis, and that it does not represent a real increase of suffering and death from this disease. Here is an excellent, though necessarily extensive, field for genuine research; but we have had sufficient of wild theorising from conclusions based upon insufficient and inaccurate premises. It now seems almost certain that cancer is not due to a specific parasite which enters the body from without, and that the related instances which appeared to point to the contagiousness of cancer (of auto-infection, of reported cases of *cancer-à-deux,* and of cancer-houses) were mere coincidences—although it is possible that a susceptibility to cancer may be transmitted to offspring. We have to discover why cancer arises *de novo* in the individual attacked; why it is so intimately associated in its incidence with the latter stages of the life of the animal; and what are the changes which the tissues undergo when they acquire cancerous properties. If cancer occurs, as there is now good reason for believing that it does, in wild as well as tame animals, and in savage as well as civilised man, the determining factors of its causation must have an extensive range in nature. The one suggestive fact is the essential relationship between age and the disease, whether it

be of the individual or (which is a different thing) of the separate organs and tissues of which it is composed.

Sanitary progress in the Navy and Army has been very considerable in the past, and statistics demonstrate a great reduction in mortality in both arms of the Service during peace times; but there remains one problem of surpassing importance to be solved. I refer to the enormous mortality from enteric fever among our troops in India; and the circumstance, recently demonstrated in South Africa, that the ravages of this disease are still capable of exceeding the losses of actual combat in time of war. While fully realising that it is not always practicable to apply our scientific knowledge to the circumstances of life, yet I cannot doubt that with a determined effort, some solution of these problems will be found to lie in the lap of the near future.

Workshop legislation in the interest of the health of the workers is gathering some of the best fruit of preventive medicine. Dust diseases are exacting a rapidly diminishing toll of diseases of the chest, and the notified cases of poisoning by lead, phosphorus, arsenic, mercury, and of anthrax were, in 1903, only about half of those notified as recently as five years ago. But if all factories and workshops could be efficiently ventilated, and at the same time kept at a reasonable temperature (conditions which I regard as physical impossibilities in many of the workrooms which I have visited, unless they are reconstructed) then a large section of the community would be spared a still considerable amount of preventable illness, would become more healthy and vigorous, and soon repay the pecuniary outlay by work more quickly and better performed. Many occupations still sin against the children, either directly by working them under unfavourable conditions during the period which should be devoted to education and physical growth, or indirectly by injuring the parents' health and lowering their vital state during the reproductive period of their lives. Cheap and effective transit so that the wives and children of workmen may have the benefit of fresh air and more roomy and cheerful surroundings; or, what is better still, the establishment of works and factories in country districts (as in the Garden City scheme), would do much to promote the physical, mental, moral, and social welfare of the workers.

From whatever direction we approach the consideration of questions affecting the health and physical development of the people, we soon come upon the housing question; and though much has been done and more is in store to improve the housing of the poorer classes, it seems destined to remain a problem for which no complete solution is to be found. In

England two-thirds of our population live in towns of over 10,000, and town life will soon prevail for three-fourths of our people. In large and small towns alike the same congested areas of population are to be found, and the same want of houses suited to the needs and the means of the working class. At the housing debate in the House of Commons in April, 1903, it was well stated by the member for Shoreditch that the character of the new century will be largely determined by the kind of houses out of which the children come. One of the greatest services, therefore, which science can render to healthy living at the present day, is to devote its knowledge and inventive power to the problem of simplifying, improving, and if possible cheapening, the ordinary middle-class houses and the homes or tenements in which the masses of our city population must not only live but rear their children. The huge depressing block-dwellings now erected in some of our largest towns, or the dreary monotonous rows of gardenless houses are I fear the only solution, if with the provision of improved and cheapened means of transit to the suburbs, people are too short-sighted to avail themselves of these. In towns there are many families who occupy but two rooms, and the overcrowding which results not only vitiates the air and leads to disease and weakly devolpment of children but also leads to immorality and vice, because of the almost necessary disregard of decency. Those in humble circumstances cannot afford to pay more for rent than one-sixth of the income earned. The class therefore which stands in most need of help is the class which does not earn more than 20 to 25 shillings per week on an average, and which therefore wants suitable accommodation at from 3s. 6d. to 4s. per week. It is in the interest of the whole of the community that these people should be housed sanitarily; but sanitary authorities are powerless to effect much good under existing conditions, for both private and municipal building enterprise are heavily handicapped by the increasing cost of land, material and labour.

At present these circumstances lead to the substitution of dwellings which can only be let at a rental too high for the bulk of those evicted, who therefore increase the overcrowding on adjacent areas. It is a question whether in order to make municipal help possible some subsidy from the rates is not called for and whether the outlay would not be compensated by a reduction in the poor rate, police rate, and sanitary rates of the district. It is now impossible for a poor family to obtain two or three rooms in London for the same sum which would have procured them a small house of their own a few years back, and thousands are almost starving themselves to pay extortionate rents. These extortionate rents

for poor class property have a great deal to answer for; they are indirectly responsible for a high death-rate, a high infectious sickness-rate (for communicable disease must run through the whole of the susceptible members of the over-crowded family), physical and moral decadence, and the restriction of families. This housing question is, therefore, not only one of local interest and concern: it is a grave national question, affecting the health, morals, and vigour of our country. It is the most pressing and important subject which Great Britain has to deal with.

With legislation that recognizes the connection of alcoholism with insanity, and with the municipal mind well attuned to recognise the connection between bad housing and alcoholism, the future is likely to see some alleviation from this disease; but most will be effected by educating the moral sense of the individual to see that excessive indulgence is a crime against one's self, the community, and even posterity—for the consequences of man's conduct in life, be it honourable or infamous, do not end with him. The expenditure on drink in the United Kingdom is about £180,000,000 a year, and it is calculated that the working classes spend about one-seventh of their income upon alcohol. Social problems are complex, and causes and results act and react. Poverty, alcoholism, and degradation tend to create and perpetuate the conditions which cause them. There can be no doubt that poverty, and the unhealthy conditions of housing which it entails, tends to promote alcoholism; but there can be no reasonable doubt that a very large proportion of this poverty is due to drink. In the opinion of those who have specially studied this question, drinking is far more often the cause of poverty than poverty is the cause of drinking. Much of the inability to secure satisfactory food and comfortable homes results from the circumstance that the money necessary to provide them is spent on drink, and as a consequence, apart from the drink itself, the associated conditions beget disease and deteriorate physical vigour. Any effective legislation which reduces alcoholism will affect at the same time every social public health problem of the day.

Although the harm resulting from over-indulgence in animal food is not to be compared with the harm that results from intemperance in alcohol, it is none the less very considerable. If the amount of proteid food needed daily for the actual physiological wants of the body is not more than from a third to one-half that ordinarily consumed by the average individual, as Professor Chittenden's experiments indicate, not only is there waste and loss of energy from the vital forces being engaged in the metabolism of matter which is not required and is of no service, but there is also the danger of the accumulation in and imperfect removal of

such waste products from the system; and even if for a time those waste matters are properly removed, excessive metabolism implies greater efforts on the part of the excretory organs than would be needed under a diet suited to the exact physiological wants of the body. This over-eating furnishes the conditions which are known to be causative of degenerative changes in the tissues, and which lead in middle life to many chronic diseases of important organs, and to death at an age when impairment of functional activity should hardly have commenced. Hence the growing popularity of certain continental institutions which have been provided for the victims of a too elaborate cuisine. Probably we should all be better, if we could, at any rate occasionally, revert to the simple elementary methods of procuring food of our Simian ancestors. These instincts are responded to by many of us, but the benefits which would otherwise accrue from sport are largely discounted by the introduction of "villainous saltpetre." If we had to stalk our game with only spears or bows and arrows (and not with a modern breech-loader) and only fed on what our prowess enabled us to capture, we might grow thin, some of us, but little would be heard of indigestion, biliousness, gout, or rheumatism.

Preventive medicine recognises no distinction of race or tongue, and I should like to refer to the remarkable progress in the reduction of diseases of the tropics. The triumphs of the past few years of tropical medicine are truly remarkable. Every succeeding year is so rich in results that it becomes a most exacting duty upon those who have to keep pace with recent advances; for they lead us wide of the fields of bacteriology and parasitology into the realms of botany and zoology. A knowledge of the details of the flora and fauna of areas in which certain diseases flourish is essential in order to arrive at the truth of the cause of these diseases, now that so many of them have been proved to be carried by certain insects. Lectureships on parasitology and helminthology have recently been endowed in this country, and there is no doubt that such lectureships will be increased in the near future, and there will be a demand for men specially qualified in this branch of work. Here tropical medicine will probably be a post-graduate study for many years to come and perhaps for all time, for a limit must be recognised to the claims upon the time and mental energies of the medical student; but those who contemplate practice in the tropics or who are likely to number among their patients many who have resided abroad, cannot afford to neglect their opportunities in this branch of study. Nor must it be forgotten that certain endemically tropical diseases sometimes threaten our own shores.

The story of the remarkable change in the yellow fever history of

Havana reads almost like a romance. The annual number of deaths from yellow fever in Havana for the ten years preceding the establishment of the mosquito theory averaged about 500, and they were cut down in two years to nothing. Little less remarkable are the results obtained in some directions from the efforts made to exterminate the malarial mosquito; but the time and money expended in this great work are quite out of proportion to the losses resulting from the malady. The part which insects play in the transmission of disease is being more and more demonstrated each year, and the dangers of the ordinary house-fly in this country are being increasingly recognised. When nowadays the house-fly enters your window, fresh from his exploits upon the nearest accumulation of filth, and then proceeds upon his perambulations upon your butter or preserve, or commits suicide in your milk, he doubtless brings upon his dirty legs filth organisms which may subsequently develop to a harmful if not dangerous extent. That this is the explanation of a certain proportion of the summer incidence of zymotic diarrhœa, I have not the shadow of a doubt.

However good and wise public health legislation may be, it is of little service unless it can be backed by equally effective administration, and at the present day it is the latter rather than the former which is at default. Prejudice, apathy, ignorance, selfishness and vested interests still exist as bars to sanitary progress, as in the days of old, and they clog the wheels alike of legislation and of administration. We possess the knowledge of how to speedily reduce the sum of infantile mortality; the death-rates of enteric fever, smallpox, puerperal fever, and consumption; the diseases due to alcoholism; and to a less degree the mortality from diphtheria, scarlet fever, measles, and whooping-cough: yet existing social conditions make progress slow and difficult. Dwellings are still ill-ventilated, dirty and overcrowded, public and domestic water supplies are still polluted, food is still adulterated, chimneys still vomit black smoke and chemical fumes, sanitary work is still badly executed, local authorities still indifferent, employers still exact labour under conditions which are disastrous to the worker's health and individuals are still careless or ignorant of the simple laws of health practised in the days of Moses. There is then so much spade work of major importance to be effected that we do well to direct our attention to this at the expense of minor matters, and to studiously eschew all sanitary fads and fancies. The sanitarian who advertises abroad a risk in licking a postage-stamp, and a danger attending the touching of street door-handles, is doing no good service to the cause. He only excites ridicule and labels us all in the eyes of the public as faddists.

But the solution of many public health problems depends upon the solution of problems which are social and political. When Mr. Charles Booth declares that 30 per cent. of the population of London are unable to obtain a livelihood; when Mr. J. S. Rowntree states that from 25 to 30 per cent. of the town population of the United Kingdom are living below the poverty line: when we are confronted with the fact that about 400,000 people in London alone are living a one-room life, where decency is not possible and morality is a farce; the magnitude of the social and political problems to be solved cannot be exaggerated. Problems of public health, moreover, change with altered circumstances and new ones are constantly evolving; many of the old ones are becoming more complex year by year, and some are so dependent upon a high ethical level among the general public for their complete solution that only the millenium can be expected to see them solved. The public health worker, therefore, can never hope for a complete realisation of his schemes and ambitions, and to his labours there can be no end. But his reward is the satisfaction of witnessing, almost daily, some beneficent result from his work, and it is this that stimulates and gives him zest.

"Does the road wind up-hill all the way?
  Yes, to the very end.
Will the day's journey take the whole long day?
  From morn to night, my friend."

SOME ASPECTS OF THE PURE MILK PROBLEM FROM WITHIN.

By C. W. SORENSEN,
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Read at Sessional Meeting, York, October 7th, 1905.

I HAVE added the last two words in the title of this paper, not because I have any startling revelations of trade secrets to make, but because I wish to discuss some of the obstacles that stand in the way of anything like a general progress towards the ideals of a pure milk supply, obstacles with which I have, as a dairy farmer, perhaps been brought more closely into contact than members of this Institute, whose connection with milk for the most part is of an official nature.

Ideals of a Pure Milk Supply.

I will assume that at the present time general agreement will have been reached that the ideals of a pure milk supply are, to put it negatively, milk uncooked, free from disease-germs and dirt, and undrugged with chemical preservatives. These conditions involve clean, healthy cows, grass fed in summer and properly fed in winter; sanitary buildings; a pure water supply; clean milking; prompt and thorough cooling; and distribution in sealed bottles or cans.

Pasteurisation not the Ideal.

It was not uncommon a few years ago to regard the non-fulfilment of any or all of these conditions as more or less effectively remedied by the application of pasteurisation, or so-called sterilisation to the milk. Neglect of these essentials, so ran the argument, induces the presence of germs; heat destroys germs; therefore heat the milk, destroy the germs, and you have pure milk. Unfortunately, the solution of the problem is not so simple. The medical evidence against pasteurisation has grown rapidly of late, and appears irrefutable. It is, of course, true that pasteurisation is carried out at nearly every municipal and private

nfants' milk depot throughout the country; not, I believe, because hose responsible regard the process as in itself rendering the milk better ›r safer, but simply because the housing conditions under which the najority of those for whom the milk is primarily intended live, are such as o impose an altogether unfair test on the keeping qualities of even the ›est and purest of fresh milk. Pasteurisation is resorted to in these cases s a necessary evil, and as nothing more.

Tuberculin Test.

The first essential to pure milk, healthy cows, leads one to consider ɾhether in this connection the tuberculin test is an essential. Medical pinion doubtless leans towards the application of this test. In Copen-agen, it has been enacted recently that all milk sold as "infants'" or nursery" milk shall be the produce of tested cows. Many hospitals and imilar institutions in this country have introduced a like stipulation in heir milk contracts. For my part, however, I confess to a decided reluct-nce to fall down and worship the tuberculin test. Even its greatest dvocates have admitted that post-mortem examination frequently fails ɔ reveal any trace of tuberculosis in cattle that have reacted; and, on the ther hand, that many of those that do not react *are* tuberculous.

Now, if the application of the tuberculin test, the sale of the reacting ows, and the purchase of fresh cows were easy operations, involving ırmers in no trouble or expense to speak of, there would be little objec-on to the adoption of the test, provided also that it were scientifically ccurate. But, seeing that such a considerable margin of error attaches ven to its honest application, not to mention the ease with which it lends self to fraud, I submit that frequent (*i.e.*, fortnightly or, at any rate, ıonthly) clinical examination of the cows by a competent veterinary ırgeon provides sufficient safeguard to consumers on the point of the ›ws' health.

This is the plan that has been carried out for many years by the well-nown Copenhagen Dairy Company, with results satisfactory to farmers, ›nsumers, and the medical profession alike.

The Factor of Distance.

The factor of distance plays an important part in relation to improve-ent in the milk supply of towns. Pure milk can, I believe, be more ısily secured where the whole work of production and distribution is ıder one management than otherwise. In the case of very large towns would be difficult, even in these days of motor-vehicles, to supply the

whole of the milk required from farms in the immediate neighbourhood. A wider radius must be drawn upon, which, of course, involves dual control, such as we see to-day in the case of the large dairy companies, with their varying standards and divided interests. On these lines the Copenhagen Milk Company of Mr. Busck has furnished us with an ideal not yet attained, though more than once attempted, in this country. But it is precisely because the combination there achieved of lofty ideals, large capital and capable management is so rare that progress under company or dual management is elsewhere so slow. A fresh attempt to remove this reproach is about to be undertaken in Yorkshire, and for the sake of the large town populations it is earnestly to be hoped that the three requisites to success will in this instance be happily combined.

The Land Question.

For all but the very large towns, however, the easiest and quickest way to secure reform would be for progressive farmers within easy access of the towns to take up the production and distribution of pure milk, beginning on a small scale and extending operations as the demand grew. But there is one very considerable obstacle in the way of this being generally done, the question of buildings and water-supply, and underlying these, the land question. Within a mile or two of all towns the prospective building value of land acts as a barrier to any purely agricultural improvements. Dairying requires good buildings (that is, light, airy and well-paved cowsheds), a sanitary dairy, and a pure water-supply. The buildings always, the water-supply sometimes, involve a considerable expenditure of capital which a yearly tenant obviously cannot undertake, and the landlord, who may at any moment desire to sell for building purposes, will not. No progressive farmer will attempt to start a model dairy with old insanitary buildings; the ordinary suburban landlord will not erect better ones; nor can the average suburban tenant under present conditions afford to become his own landlord. Here we have one of the main hindrances to progressive dairying. I may perhaps be permitted to give my own experience on this point, as it serves to illustrate my contention.

Three years ago I started a pure milk dairy on my present farm, commencing with three cows. I may say I had no ordinary landlord, inasmuch as he not only built for me a model cowhouse to my own design, but at considerable expense to himself had town water laid on to the farm a year or two before he required it for his own building schemes. The dairy proper I adapted at my own cost out of an existing building. By the end

of the first year the three cows had increased to thirty, and in eighteen months to fifty. But as the farm originally was only one hundred and twenty acres in extent, and some ten acres of that had meanwhile been resumed by the landlord for building purposes, more land became necessary if the business was to develop freely. But this is just what was not to be got. One farm had dilapidated buildings. Another with fair buildings had a bad water-supply; a third was too far from York, and so on. So there was but one alternative: to check the effective demand by raising prices, already comparatively high. This was done, development was arrested, the herd remains still at fifty cows, and my customers have had to pay fifteen to twenty per cent. more for their milk than they would have done were it not for this land question.

MUST BETTER MILK COST MORE?

This brings us to the question of price. In a recent work, "Infant Mortality and Infants' Milk Depots," Dr. McCleary states that "if the movement for the reform of the milk supply raises the price of milk so as to take it beyond the reach of the poor, the milk reformers will have done more harm than good." This seems to me the same thing as saying that there shall be no reform at all. If we have to employ extra labour to groom the cows, provide clean smocks for the milkers, ice for cooling, dairy-maids to bottle the milk and wash the bottles and so on, the milk *must* cost *somebody* more. If this cost is to be borne by the farmer or retailer, I am afraid that their interest in reform will be of a somewhat limited description. I admit that there is a way to secure better milk for the same or even less money than is paid now, and that is to adopt economies in another direction, viz: in the system of distribution. If the public will be content with one delivery a day instead of two, for instance, as is the custom in Copenhagen, a big saving may be effected. A yet greater saving might be made if the delivery of our milk could be established on the same basis as the delivery of our letters; in other words, if it were municipalised. I am not sure but that Dr. Lawson Dodd has hit the right nail on the head when he says in his little book "The Problem of the Milk Supply":—"The only way to get both low price and better article is by means of the enormous economies in distribution, cartage, etc., which would at once result from municipal ownership."

But that is a question big enough to have a paper and conference all to itself. At present, public opinion is hardly ripe for municipalisation of the milk supply. Nor is the average housewife altogether prepared to

forego her second delivery. So that, barring economy in distribution, I fancy Dr. Chapin, the founder of what is known as the certified milk movement in America, comes nearest the mark when he says, in his "Theory and Practice of Infant Feeding," that "higher prices to the farmer is the solution of the milk problem, and the dealer should also have extra compensation for any additional labour and care on his part." And this, surely, is the common sense of the matter. Those who want a better article than they are getting at present must, whether wholesale or retail buyers, pay more for it. It has been my experience that there is in every town a large nucleus of customers, not only in the upper and middle classes, but also among artisan families, who are willing to buy pure milk if they can get it, and to pay more for it too.

I have only to add that the satisfaction of this demand for pure milk affords a most pleasant, healthy, useful and perhaps profitable occupation for anyone who has the necessary experience and is able, in one way or another, to overcome the special difficulties that I have indicated in connection with the land.

THE EARL OF STAMFORD, Vice-President of the Institute, moved a vote of thanks to Mr. Sorensen, and remarked that he had been struck by the enormous waste and cost in our present system of distribution. If that could be reduced probably the cost of pure milk could be kept at a price which would make it within the reach of poorer people.

MR. PHILIP BURTT (York) said it was a little more than a year ago since he went to Denmark. He was accompanied by a gentleman who was a member of the medical faculty, and as the result of what they saw there they developed much enthusiasm on the question of a pure milk supply, and they were not satisfied until something was done in the North of England on similar lines to what had already been established in Copenhagen to secure a supply of clean bottled milk. A week ago last Wednesday there was opened at Northallerton a depot for the purpose of collecting pure milk from the farms, bottling it and sending it into the large towns of the North of England, beginning with Newcastle-on-Tyne. The man who was full of ideals like Mr. Sorensen was always coming up against difficulties. Mr. Sorensen had put before them two difficulties, the difficulty of the land question and the difficulty of prices. No doubt there were very serious difficulties connected with the land question, but he did not think he should put them so high as Mr. Sorensen had done. They had to recognise that everybody's influence was limited, but what they wanted to see was a number of Sorensens spring up in other directions. If you took a town like York with a population of 70,000 inhabitants, the average

consumption of milk per head was between 30 and 40 gallons per annum, and if to find out the number of cows necessary on the basis of this consumption they estimated the supply of York, that would be about two and a half million gallons; and if they put the yield of a cow at 500 gallons, then they would want about 5,000 cows to supply York with milk. Mr. Sorensen had told them that he had 50 cows, so that if they had 100 Mr. Sorensens dotted all round the circumference of York that would give them an ideal milk supply. That was the way perhaps to get over the difficulty with regard to the Land question. There might be as far as he knew 5,000 cows round about York; if there were, what they had got to do was to induce the owners of the cows to go in for the methods that were being advocated at that meeting. But when they came to the case of large towns like Birmingham, Manchester, Liverpool, etc., it was impossible to supply milk from suburban farms; then came into consideration the question of distance which Mr. Sorensen had referred to, and quite a different set of difficulties arose. Often milk had to be conveyed 50, 100, 150, or even 200 miles by rail, and in that case the main difficulty was to ensure purity and cleanliness at all points of the journey. A pure milk Society (called "The Wensleydale Pure Milk Society") had been formed of a number of people in the North of England who were earnest about the question, and they wanted to see milk obtained purer and cleaner than at present. One need not hesitate to say that the milk that was produced on most farms to-day was produced under very undesirable conditions. The function of the Milk Society was to select milk from farms whose methods were absolutely clean in regard to milking. The milk should be cooled as soon as it was drawn from the cow, in a room separate from that in which it was drawn; soap, water, and a towel must be supplied to the milkers to wash and dry their hands before commencing to milk, and the cows must be kept well groomed and in proper buildings. These were the regulations which were laid down, and the Society would only take milk from farms which would accept these conditions. The milk was conveyed to the depot at Northallerton, and it was kept there during the four or five hours of the night, instead of being sent forward to the receiving station and allowed to stand there in cans on the station platform, very often under undesirable conditions. Then of course another great object of the depot would be to wash all the cans and bottles, and see that they were kept scrupulously clean. The other difficulty referred to by Mr. Sorensen was the question of price. They could do a great deal by co-operation that they could not do as an individual, and what they were endeavouring to do was to carry out the spirit of co-operation in its widest extension. They wanted the farmers to co-operate with the Milk Society, and they wanted the Milk Society to co-operate with the distributors, and he thought there was a very fair prospect of securing a wide and practical application of the spirit of co-operation, although it was when they came to attempt co-operation between producers and distributors that they came in contact with the real difficulties. However, the result of it all in regard to

price was that the Milk Society had been selling for ten days this guaranteed milk at the same price as the rest of the milk delivered in Newcastle. 4d. per quart. He must not speak too soon about the success of the venture. Enthusiasts were always apt to be too sanguine as to the success of their own enterprises, and time only would show. Undoubtedly there were many real difficulties that they would come in contact with. It was just the time now when farmers were renewing their milk contracts, and one thing they found was that they were unable to send off their morning's milk by the early morning train. The farmers said they could not get up their farm hands early enough to milk the cows, and these were real difficulties which were far more important than the difficulties connected with land and price, however serious these might be. In all these things, it seemed to him, it was the reform of the human unit that was the real difficulty. One of his pet theories about economics was that they wanted a new ideal in economics and trade, and that they should pay less attention to the old maxim of buying in the cheapest and selling in the dearest market, and more attention to the modification of demand, and the alteration of the tastes of the people, out of which all demand arose, and to the improvement and enlargement of supply.

Dr. J. Spottiswoode Cameron (Leeds) related the history of the pure milk movement in Leeds. About three years ago a suggestion had been made to the Yorkshire Ladies' Council of Education and to the Leeds Sanitary Aid Association that they should establish a depot for the supply of humanised milk. A joint committee of these societies investigated the matter, and after visiting other towns communicated with the Corporation, saying that they were willing to undertake such a scheme, if the Corporation would give them a grant towards the installation. The Sanitary Committee offered a grant of £500 on certain conditions. Difficulties, however, arose, and this spring the Voluntary Committee reported that they scarcely saw their way to secure a continuance of the scheme if they established it. After some consideration the Sanitary Committee resolved, as they had already put £500 in their estimate for the purpose, to carry out the work themselves, but modified the scheme in the direction of dealing in pure, cooled, bottled milk, rather than modified and pasteurised milk, as at Liverpool, St. Helens, Bradford, Battersea, and other places. A subcommittee visited the farm of Mr. Sorensen to see his methods, made arrangements for a depot in the town, and a cooling and bottling plant at one of the parks, and agreed with a neighbouring farmer for a supply of milk to be collected under the immediate supervision of their own officers. When the committee's resolutions came before the council at their meeting on July 5th, they were opposed as *ultra vires* and the whole matter was shelved for a month. At the meeting of the council on the 2nd of August the Lord Mayor ruled the Sanitary Committee's resolution out of order, suggested that the Sanitary Committee should seek parliamentary powers, and, to satisfy the pressing demand, generously

offered a subscription of £250 towards the £500 estimated as required for the establishment of a pure milk depot on a voluntary basis. It was the intention of the Sanitary Committee specially to supply this pure milk to the parents of infants in the South-East Registration District of Leeds. In this district the infantile mortality for the last ten years had been at the rate of 214 per 1,000 births; while in the Chapeltown district of Leeds during the same period it was as low as 118. The opportunities in the former district of getting pure milk were few, the conveniences for keeping the milk pure after purchase were absent. In this district, for some years back, special efforts have been made by extra scavenging and flushing to keep down the death-rate. For several years visits have been made by the women inspectors to every house where a child under two years of age had died, from whatever cause; and since the beginning of the present year the house in which any birth occurred has also been visited by one or other of these ladies, and an attempt made to guide the mothers in the proper feeding of their infants, by means of printed and verbal instructions. Bacteriological examination of the milks sold in this district showed that they were much more polluted than those sold, say in Chapeltown, and as soon as the Lord Mayor's cheque and other subscriptions were available, a distribution of milk to the families where there were young children was commenced under the immediate supervision of the women inspectors. In that way during the last two months 116 persons have been supplied with bottled milk. In some cases the mothers of young children were persuaded to take the milk themselves, and thus humanise it for the sucklings. In all cases breast feeding was recommended wherever practicable. Counting those cases in which the milk was taken by the child indirectly through the mother, 39 infants under six months of age had thus been fed, 37 between six and twelve months, 16 between twelve and eighteen months, and 8 between eighteen months and two years. Of course in these older children the milk was supplemental to other food, and in every case it was explained to the mothers how the milk should be used. No attempt was made to give bottles containing single feeds, but the milk was supplied in either pint bottles or in six ounce bottles, three of the latter being given at the same price as one of the former. Where the children were bottle-fed, the proportion of the cooled milk put into the feeding bottle was explained, and the quantity of boiled water that required to be added. Nine children over two years received the milk and seven adult persons, making a total of 116 in this South-East district. Two children under six months and one other under a year died after about three weeks' use of the milk. The milk was discontinued in seventeen cases; in nine, on account of poverty; in four, because the people had removed from the district; in two, one an adult and one a delicate feeding mother, because in each case the health had so improved that it was no longer necessary. In another case the milk was given up on account of the distance it had to be fetched, and in the remaining case the mother thought it did not suit the baby. Ninety-nine persons, therefore, took the milk

regularly. Bacteriological examinations of the milk have been made and also of other milks in the town, the result being that the average number of colonies in a cubic centimetre was about 79,000, while colon bacilli were only found in one out of ten examinations. These ten samples were almost all morning's milk, and were examined at the University Laboratory. Samples of afternoon milk examined at our own laboratory were found even less rich in bacteria. On the other hand, fifteen samples taken in various parts of the town on the same dates, some of them from the best milk supplies, contained an average of 1,767,000 colonies per cubic centimetre. Colon bacilli were found in every case; in six of the cases more than 1,000; in six more than 100; and in three between 10 and 100. What we have done practically is to receive the milk from the cow in a carefully scalded can of our own, into which we immediately insert a cylinder containing ice. The milk is then taken down to the cooling-room at Potternewton Park, about 300 yards from the milking shed. It is there filtered through a Ulex filter containing sterilised cotton wool, and is passed over a cooler through which iced water circulates to a filler, from which it is bottled. The bottles are kept in contact with ice until they reach the depot or the shop. In both cases, during the hot weather, a supply of ice is provided to keep down the temperature. At the shop the milk is sold at what is practically cost price (1½d. for a pint and ½d. each for the small bottles) to the holders of white tickets distributed by our lady inspectors. A coloured ticket is supplied to those who cannot pay this amount, and from whom we undertake to collect the payments ourselves. The shopkeeper is allowed to dispose of the surplus at 2d. a pint. We allow him 2d. in the shilling upon the amount passing through his hands, counting the coloured tickets, for which the money is collected by ourselves, at the same rate as the white ones. Of course this involves a loss, as the whole expense of cooling is unprovided for, and a discount is given off the receipts; but we have the satisfaction of distributing the milk where it is most needed. If we can get a sufficient supply, we shall be willing to put upon the market at a remunerative price a supply of pure milk. In the meantime the experiment has been worked for the benefit of the babies in the South-East district, and, so far as they are concerned, with great success.

ALDERMAN D. B. HEWITT (Cheshire) said that if the price of pure milk was raised a large proportion of the poorer population would be unable to buy it. He described how closely the farmers of Cheshire were watched by the municipal authorities of Manchester, Liverpool, and Birkenhead.

DR. J. R. KAYE (West Riding County Council) said he was pleased that Mr. Sorensen had insisted on raw, clean, and pure milk from well kept and healthy cows as the ideal supply. To secure such a supply pasteurisation and the addition of chemical preservatives were of no avail; indeed it was probable that

The growing custom of adding preservatives would have a retarding effect on the general movement in the direction of the ideals aimed at by Mr. Sorensen. When milk was produced by unhealthy and dirty animals amid insanitary surroundings, and when it was stored and conveyed negligently or mixed with the remnant from the previous milking, then the sooner it went bad and became unsaleable the better. The addition of chemicals might prevent or postpone its going bad, but this could never bring them one step nearer to the solution of the pure milk problem. The Departmental Committee had evidence that with proper arrangements pure milk could be carried one hundred miles without harm. One very large dairy company guarantee to deliver all their milk free from preservatives, while another large company supply their district managers with large consignments of preservatives for regular addition. This question of preservatives was one of the most important affecting the milk supply at the present time. Why should a chemically treated milk be allowed to compete unfairly with a fresh undrugged article? Why should a person who expects to get pure fresh milk have his senses deceived by antiseptics? and why should an infant, an invalid, or an enteric fever patient be required to swallow unconsciously a daily dose of boric acid? Dealers said that it was a boon to the public, preventing the waste of milk and helping to keep the price down. In his opinion it was often a direct block to progress, acting as a cloak for uncleanliness and insanitary conditions at the cowshed and dairy and placing obstacles in the way of the producer who was anxious to rely solely on hygienic means.

DR. J. MITCHELL WILSON (East Riding County Council) said that he was a representative of a district which is mainly agricultural in character. He was very much interested in Mr. Sorensen's paper, especially as he had demonstrated that the trade of milk supplying could be conducted under the most satisfactory sanitary conditions and also as a success financially. Mr. Sorensen stated that his ideals of a pure milk supply are:—That it shall be obtained from clean healthy cows properly fed, housed in sanitary buildings, supplied with pure water, that there should be clean milking and prompt and thorough cooling of the milk; and if they omitted the distribution of milk in sealed bottles and cans, there was none of the conditions but which may reasonably be required from any cow-keeper. Medical officers in rural districts willingly acknowledge the good work that has been done by the authorities of our large towns in urging upon the attention of the public the need of a pure milk supply, but he feared that the question might be dealt with mainly as it affected town populations, forgetful of the fact that there were many millions of the population in England and Wales who live in small towns or rural districts to whom the question of a pure milk supply was also of the greatest importance. He therefore thought that the Local Government Board, as the central authority, might do even more than it has done in advice and guidance to the local authorities in this

matter. Especially might the adopting of regulations for dairies and cowsheds be made no longer optional but compulsory, and a yearly record of the work done in supervising the milk trade should be required from every district council. Under the Public Health Act of 1875, a district council who failed to supply an adequate supply of wholesome water for its district could be complained of as being in default, and it would be in accordance with the anxiety that was now being shown regarding their pure milk supply, that any district council who neglected this work might also be complained of as a defaulting authority.

PROF. R. S. SETON (Leeds University) recognised that he was addressing a body largely composed of medical officers of health, and whilst admitting that improved methods of dealing with milk might be adopted by dairy farmers, he expressed the hope that such a body, when framing any new rules, would consider at the same time the practicability of the same, and he might suggest that it would be advisable for both medical officers of health and farmers to confer together on this important subject. It had been stated that any increase in the price of milk would tend to, or actually, discourage the sale of that commodity. In this connection he endeavoured to point out that if stringent regulations were adopted with regard to tubercular cows it might entail an entirely different system of breeding, housing, etc., and perhaps a much smaller yield from each cow, in which case a higher price would certainly have to be charged for the milk. The systems of breeding, housing, etc., as they affected the health of cows, were points upon which there were differences of opinion amongst breeders, and if it were possible for improvements in this respect to be introduced without affecting the yield of milk, it might then be sold at about the same price as at present.

DR. S. DAVIES (Woolwich), criticized the statement that "the evidence against pasteurisation was irrefutable." If this were so, how could municipalities rightly provide pasteurised milk; and yet it was the almost universal practice of municipal and philanthropic milk depots either to sterilise or to pasteurise. This was done even at the dairies of M. Destin Frères, Rouen, and of Mr. Carson, Theydon Bois, who produced the milk used respectively by the Rouen and Finsbury milk depots, and produced it under model conditions such as those the conference had come to inspect at Mr. Sorensen's farm. He agreed with Dr. Cameron that Mr. Sorensen had not given sufficient reasons for denying the usefulness of the tuberculin test, when honestly applied. He would have liked to hear more about the fraudulent way in which farmers defeated the test; but instead of giving up tuberculin they must seek to defeat their dishonest practices. He considered that Dr. McCleary was right in insisting that the price of milk must not be raised if general benefit is to result. The most important word said at that discussion was Mr. Burtt's statement that his company had been able to provide pure milk to Newcastle at the ordinary commercial price. He sincerely hoped the company would be able to continue doing so.

Mr. Sorensen's proposal that milk should only be delivered once a day appeared a practical and simple way of keeping down the price. While having no persona objection to the municipalization of the milk supply, he considered that the chief *raison d'être* of municipal milk depots at present was, that by them single feeds for each of a bottle-fed baby's meals were provided in separate bottles, so preventing home contamination of the milk, which was the chief source of summer diarrhœa.

DR. E. M. SMITH (York) said that as medical officer of health for this ancient city and agricultural centre it would, perhaps, be appropriate for him to say a few words. As to the York milk supply, on the whole the sanitary authority got on very well with the milk dealers supplying the city. They had had comparatively little trouble as to adulteration, tuberculosis, or association of milk supply with infectious disease. During recent years they had gradually obtained improvements in the cow-sheds, but there was still considerable room for improvement both in cow-sheds and in methods of milking and methods of sale. They needed to have less of that unreasonable unteachableness unfortunately assumed by some milk producers. Such a spirit was antagonistic to all progress; and it was utterly wrong, because the community have a right to demand that so important a food supply should be absolutely safe and beyond suspicion, prepared and sold in accordance with the rapidly increasing knowledge on the subject. They should abolish or improve upon the sale of milk from door to door ladled out of one common can, with its irresponsibility and its attendant perils of contamination by dust, dried street manure, rain, etc. Again, milk sold in general provision shops should not be exposed in open vessels to the dust, the flies, and the effluvia of onions and other such provisions. He pointed out that there was nothing palatial or costly at Mr. Sorensen's farm. There was nothing but that which could be adopted and easily carried out by every milk-farmer in the country. Certain simple rules of hygiene, based on correct science, were carried out as simply and cheaply as possible: clean cattle, light, airy, clean cow-sheds, out-door life for the cattle, clean milking, rapid immediate cooling of the milk, freedom of exposure of the milk to dust and other contaminations, distribution and sale in sealed cans or bottles. He would like to see the same or similar methods adopted by every milk producer throughout the country. If these improved methods should really require a slight increase in the price of milk, then they had better have the higher price and a pure article than an article carrying the possibilities of disease and death. If more legislation on the subject be needed, it might prove to be a great help if all milk producers and purveyors were licensed, the granting and continuance of the licence being dependent upon the observance of the regulations under the Dairies and Cowsheds Order, of the regular performance of clean milking and of sealed distribution from dairy to consumer. But above all they wanted less of the spirit of mere compliance with minimum requirements, a little more teachableness, a little more science, a fuller compre-

hension of the vital importance of the matter to the community, more earnest and conscientious co-operation with sanitary authorities and with sanitarian experts. There was no reason why York, with its pure water supply now rapidly extending into the rural districts around the city, and with its milk producers within a short radius of the centre of the city, should not become one of the pioneer towns in this great movement for a pure milk supply.

Mr. Anderson (Middlesbrough) felt that as sanatarians they should be satisfied with nothing less than what Mr. Sorensen advocated. There was nothing unreasonable in demanding that cowsheds should be well ventilated, that cows should be properly groomed, a pure water supply provided, that the attendants and all utensils used should be kept at all times scrupulously clean. He would, however, like to know from Mr. Sorensen how he proposed to supply *pure new* milk by one delivery daily. The chief difficulty that the farmer had to contend with was the unequal periods between the milkings. In the morning this usually took place at 5 o'clock, that the milk might be delivered in the town in time for breakfast; and in the afternoon at 1 o'clock, in time for tea. Thus they had sixteen hours between the afternoon and morning milkings, and only eight hours between the morning and afternoon. It was a well-known fact that the morning's milk (owing to the lengthened period) was much poorer in quality than the afternoon's. In numerous instances he had known the morning's milk to contain less than 3 per cent. of fat, whilst that in the afternoon, from the same herd, contained $4\frac{1}{2}$. The farmers naturally complained (from their point of view) that sanitary inspectors invariably take samples of milk in the morning (when it is known to be poor), but rarely in the afternoon. If Mr. Sorensen intended mixing the morning's and afternoon's milk, they would secure a better average quality, but *new milk* would be a thing of the past. He was strongly of opinion that local authorities should be invested with the power of regulating the sale of milk. It was simply a farce that any person might sell milk by being registered. He had frequently seen milk sold in small shops, where onions, paraffin oil, and even coal, were retailed. Surely they should be empowered to state under what condition they could register, and be enabled to either remodel, or revoke, the licences now held for many unsuitable premises in which this commodity was sold regardless of the danger to the public health.

Mr. J. A. Dixon, M.R.C.V.S. (Leeds), said that Mr. Sorensen's statement was the first serious doubt that he had heard expressed of the efficiency of tuberculin as a diagnostic agent, since the initial stages of its introduction, when naturally mistakes were made and ascribed to tuberculin. Of course all authorities recognised that occasionally one met with an animal which re-acted to tuberculin, but in which post-mortem examination failed to reveal any lesion of tuberculosis, but these did not amount to more than one or two per cent. of the animals tested, and there was often reason to suspect in these cases that the mistake was not on the part of tuberculin. The belief that the good opinion of

tuberculin was maintained by most authorities was upheld by a recent statement from a gentleman who attended the International Veterinary Congress at Budapest a few days ago. He reported that amongst other places visited by the delegates was an establishment for the manufacture of serums, etc. This gentleman described the production of tuberculin there as being in "enormous quantities," and made a special note of the fact that the institution was managed on strictly business lines, and that this great output of tuberculin signified a similar great demand. He had had an extensive experience of tuberculin testing, during which he had found that not only was it a reliable method of diagnosis, but that with a businesslike and enterprising dairy farmer it was an economical procedure, because not only could the farmer sell more milk and get a better price for it, but he could feed dry cows for the butcher with greater confidence, because they always repaid him better than doubtful cows. He agreed with Mr. Sorensen as to the importance of clinical examination of dairy cows, but that was not always sufficient. Speaking pathologically, it was understood that a tuberculous lesion in the udder or elsewhere probably started as a speck invisible to the naked eye, and it was also understood that the progress of the lesion was generally very slow, so that supposing a lesion to commence in the interior of the udder and perhaps two or three inches from the surface, it would probably be at least two months before the diseased condition could be recognised by the most careful clinical examination, so that for a thorough safeguard against tuberculous milk it was necessary in some cases to supplement clinical examination with the tuberculin test.

MR. C. W. SORENSEN (York), in reply, regretted that time would not permit him to deal with the many interesting points raised by various speakers, but, in answer to Dr. Cameron's inquiry as to who made the post-mortems where no lesions could be found in cattle that had reacted to the tuberculin test, he said such cases had been reported by several competent observers, among whom he would mention Mr. J. A. Gilruth, Chief Veterinary Surgeon and Bacteriologist to the New Zealand Government, and Mr. C. J. Reakes, M.R.C.V.S., also of the New Zealand Government staff. As to the difficulty of making milk keep well enough for a system of delivering once a day to succeed, Mr. Sorensen said that if the cows were cleanly milked and the milk thoroughly cooled, there would be no trouble in keeping it sweet for twenty-four or even forty-eight hours. In conclusion, he remarked that he felt almost ashamed that his work should be made the subject of such appreciative and flattering references as had been made by several speakers, inasmuch as all he had done was to apply simple cleanliness all round. It was a sad reflection on the average milk producer and distributor when what ought to be ordinary cleanliness should call for such extraordinary approval.

DR. CROWTHER (Leeds) also took part in the discussion.

PARTICULARS OF MODEL COTTAGES AT EARSWICK,

Visited in connection with Sessional Meeting at York, Oct. 7th, 1905.

By T. H. APPLETON.

THE building of the model cottages, which some of the members of this Institute are to inspect this afternoon, was begun about four years ago. It is a sociological experiment, intended as a contribution towards the solution of the housing problem as it affects the working classes. Mr. Joseph Rowntree, Chairman of Rowntree & Co., Ltd., of the Cocoa Works, York, had long felt the need of such an experiment in this part of the country, and in 1901 he bought an estate of a hundred and twenty acres, about two miles north of York, and adjoining the Earswick station on the York and Hull branch of the North-Eastern Railway. Immediately on the completion of the purchase, Messrs. Parker and Unwin, who are now the architects for the Garden City at Letchworth, were instructed to survey the estate, and to prepare a plan showing the line that they would suggest for its future development as a garden village. Plans were also prepared at the same time for the first block of two cottages, and the building of them was at once proceeded with. Other blocks have been added from time to time during the last three years, until now there are forty-eight houses on the estate, thirty-eight of which are inhabited, and the remaining ten will soon be ready for occupation. The population of the village at the present time is about two hundred.

About a year ago Mr. Rowntree, desirous of perpetuating this housing scheme, created a charitable trust, called "The Joseph Rowntree Village Trust," and made over to the trustees the whole of the estate with the houses already built upon it. At the same time he transferred to the Trust a large amount of invested capital, which, together with the ever-increasing income derived from the rents of the houses, and from the rent of a farm on the estate, will form the endowment of the Trust, the

purposes of which in the future will not necessarily be confined to the neighbourhood of York.

The object of the Trust, as set forth in the founder's deed, is to alleviate the evils which arise from the insanitary and insufficient housing accommodation for large numbers of the working classes, and to secure to workers and persons of limited means in the neighbourhood of large towns some of the advantages of outdoor village life. To this end the trustees are to provide improved dwellings with open spaces and gardens; and to organise a village community on such lines as will insure to all on the estate the enjoyment of full and healthy lives.

It may be well to mention here that the trust deed expresses the wish of the founder that not less than one tenth of the available land, exclusive of roads, shall be laid out and used as parks, recreation grounds, and open spaces; and also provides that no houses shall occupy more than one fourth of the site on which they are built. On this basis the Earswick estate would admit of the erection of about seven hundred houses, should such a number be required.

The term, working classes, mentioned above is not meant in a narrow sense; in it are included not only artizans and mechanics, but also shop assistants and clerks, and all persons dependent upon a small income of their own earning. It may also include persons having small incomes derived from invested capital or pensions. In the preparation of the Trust, great assistance was obtained from the Deed establishing Cadbury's model village at Bournville.

So far, the aim of the founder to establish on the estate a community self-reliant, and developing a spirit of civic responsibility, has met with marked success. There are no empty houses, and there are no arrears of rent. A club has been opened, and is being managed by the tenants themselves, they having rented a house for the purpose. During the summer months, as might be expected, the gardens claim their chief attention, but in the winter months full use is made of the club by the men and boys on the estate. The club premises contain a game-room, a reading-room and a room for committees. Concerts organised by the tenants are held from time to time in connection with the club. Next year a village-hall is to be built that will be available for all the purposes of a club, and for religious services on Sunday. At present the Vicar of Huntington conducts a service in the club in the afternoon, and the Wesleyans in the evening. The trustees do not seek in matters of this kind to exercise any control, the founder's desire being that "the administration of the Trust shall be absolutely unsectarian and non-political, and that there shall

always be a rigid exclusion of all influences calculated to impart to it a character sectarian towards religion or belief, or exclusive as regards politics."

A village council, consisting of seven members elected by the tenants, and six elected by the trustees, is in full working order. It has a voice in all matters affecting the welfare of the village, such as for instance the style and position of the houses to be built, the choice of the position for the children's playground, or the lighting of the roads. The architect's plans are put before the council, and any suggestions coming from it are carefully considered by the trustees before the plans are finally passed. Various useful suggestions respecting the plans for the houses have been made by the tenant members of the council, and these suggestions have shown the wisdom of not building too many at one time, but rather of ascertaining by experience the needs of those who are to live in them. Economies in methods of construction have also been discovered.

Passing on to the houses, we may notice that up to the present there are three types on the estate, the rents for which are 4s. 6d., 5s. 9d., and 6s. 2d. each per week respectively, not including rates, which amount to 3s. 4d. in the £, including the water-rate. The first type, letting at 4s. 6d., per week, or £11 14s. per annum, comprises, on the ground floor, a large living-room, measuring 20 feet 6 inches by 12 feet, and a scullery; and on the upper floor three bed-rooms, each having a fireplace. The living-room is fitted with a good cooking-range, cupboards, etc., and a larder opens out from it, having two cold slabs for milk, meat, etc. The scullery contains a bath, covered with a wooden leaf, which can be used as a table, and a copper with patent exhaust to carry the steam direct into the flues. The staircase has a window for light and ventilation, and at the top of the stairs is a large cupboard, which makes an excellent wardrobe.

The second type of house, letting at 5s. 9d. per week, or £14 19s. per annum, has all the conveniences of the first. It differs from the first only in having built out of the living-room a large square window, which forms almost another little room, and the scullery contains a cooking-range for use in the summer. The bath in this type of house is partitioned off the scullery.

The third type, letting at 6s. 2d. per week, or £16 0s. 8d. per annum, differs from the first and second in that it has, in addition to the living-room, a small sitting-room measuring 12 ft. by 10 ft.

The walls of the houses are covered with "Durite" plaster, which dries quickly, and gives a very hard smooth surface. A picture moulding

is run round each room, to obviate the necessity of driving in nails. Every house on the estate is fitted with gas throughout, and has also the city water laid on. Each house has a garden of not less than 350 square yards. After careful inquiry amongst the tenants by the members of the council, it was found that this area of 350 square yards is as much as a man can suitably work in his spare time. There is a distance of not less than 60 ft. between one block of houses and another. Each block differs somewhat in external appearance from its neighbour, and the blocks are so disposed as to avoid the monotony of long streets or terraces. The roadways on the estate are 18 ft. wide, with 6 ft. grass verges on both sides between the road and the footpath, and trees are planted on these verges. It will be seen, therefore, that the clauses in the Deed providing for gardens and wide spacing are being adequately carried out.

A meeting of this kind will wish to know how the sewage is disposed of. At the present time it is being dealt with temporarily by means of chemical precipitation with alumino-ferric, followed by a treatment through a percolating bacterial filter. The permanent scheme has, however, been decided upon, and the work has just been commenced. It will be upon the following lines:—The estate will be equally divided, each half forming a separate drainage area. The sewage will gravitate to a central position in each of these areas. It will then be lifted from these points by means of two sewage-ejectors, operated by compressed air, along a rising main to the northern extremity of the estate, where the purification-works will be situated. Here the sewage will first be delivered into an equalising chamber, whence it will flow at an equal rate throughout the day into a detritus chamber, and afterwards into septic tanks, from which it will be automatically delivered into a system of triple contact beds, and thence it will again be automatically discharged over a percolating filter-bed, the effluent passing into the River Foss. It is anticipated that a purification of 95 to 97 per cent. dissolved organic matter will be effected, and thus that the water passing into the Foss will actually be purer than the Foss itself.

And now as to the cost of the houses. For the first type of house, including cost of the land at £80 per acre, the making up of roads, laying-out of gardens, erection of gates and fences, and its proportion of the final sewerage-scheme, the cost has been £249 3s. per house; for the second type the cost has been £298 13s. per house; and for the third £326 3s. per house.

Allowing, say, 1 per cent. upon the cost for repairs and depreciation, each type of house gives a net return on the outlay of from 3½ to 4 per

cent. Over the whole the return averages about 3¾ per cent. Great pains have been taken to build as cheaply as possible, consistent with good and sound work; as it was felt that if the experiment was to be widely followed and to serve as a contribution towards the housing problem, it had to be proved possible to give adequate and sanitary accommodation amid pleasant and healthy surroundings, and still to get a fair business return for the outlay. It will be seen, therefore, that while the idea at the back of the scheme is sociological, it is nevertheless being carried out on strictly business lines.

The popularity of the scheme is beyond question: the houses are eagerly sought for. The applications now upon the books will require two or three years to overtake, and others are constantly being received. The improved health of those who have gone out from York to live upon the estate is very noticeable. Difficulties as to shopping and the attendance of children at school, etc., are being overcome, and there is every prospect that a few years will see a large colony enjoying the combined advantages of town and country life.

Detailed Cost of each Type of Cottage.

	Type 1.	Type 2.	Type 3.
	£ s. d.	£ s. d.	£ s. d.
Erecting, complete	180 0 0	225 0 0	250 0 0
Land, one sixth of an acre per house at £80 per acre, including its portion of Roads, &c.	13 0 0	13 0 0	13 0 0
Proportion of cost in making Roads	10 0 0	10 0 0	10 0 0
Making-up and laying-out Gardens, erecting Fences, &c.	8 10 0	8 10 0	8 10 0
Estimated proportion of cost of final Sewerage Scheme	15 0 0	15 0 0	15 0 0
Office and Supervision Expenses at ten per cent. on total cost	22 13 0	27 3 0	29 13 0
	249 3 0	298 13 0	326 3 0

DECISION OF COUNCIL ON RESOLUTIONS PASSED AT MEETINGS OF THE INSTITUTE.

SESSIONAL MEETING held at York, October 7th, 1905, following a paper by Mr. C. W. SORENSEN, and discussion on *The Pure Milk Problem:*

> "That this meeting of The Royal Sanitary Institute recommends the Council to urge upon the Government the desirability of putting upon the Statute Book at an early date the recommendation of the Preservative Departmental Committee as to the compulsory absence of preservatives in milk."

The Council decided that this resolution be forwarded to the Local Government Board.

NOTES FROM THE REPORTS OF THE MEDICAL OFFICERS OF HEALTH.

BIRMINGHAM WATER SUPPLY.

Extract from the Report of the Medical Officer of Health for Birmingham for 1904, JOHN ROBERTSON, M.D., B.SC.

Few towns have had to deal with a more difficult problem than has Birmingham in obtaining an adequate supply of water of a character which does not admit of the probability of contamination. The chief reasons for this difficulty have been the size of the town to be supplied and the character of the country surrounding it.

On July 21st, 1904, the new Welsh supply was formally inaugurated by His Majesty the King, who then turned on the water from the works at Rhayader. It will be some little time yet before the whole of the city is supplied with Welsh water, but the knowledge that in time this pure soft water is to replace the hard unsatisfactory water of our old supply will remove considerable responsibility from the Health Department. The old supply, as is generally known, was derived from six deep wells and from five brooks.

The new supply has proved to be of even better quality than originally anticipated. It is not an acid moorland water, as is supplied to so many of the large towns, but is a soft, faintly-alkaline water, well aërated, and containing no objectionable organic or inorganic constituents. But far more important than this is the fact that the chance of contamination has been reduced to a point

beyond which it would be unnecessary to go. We have, therefore, not only a pure water, but one that cannot become contaminated.

The City Analyst has supplied the following analysis:—

Total Solid Matter	7·2	parts per 100,000.	
Ammonia { Free	0·001	"	"
Ammonia { Albuminoid	0·006	"	"
Nitric Nitrogen	0·000	"	"
Oxygen consumed (4 hours at 27° C.) ...	0·13	"	"
Chlorine in Chlorides	1·1	"	"
Hardness as $CaCO_3$	3·4	"	"
Alkalinity as $CaCO_3$	3·0	"	"
Plumbo-Solvency (Houston's Method) ...	0·03	"	"
Plumbo-Erosive " " 7 days	0·2	"	"
" " " " 14 days	0·4	"	"

It will be observed that the amount of total solid matter amounts to 7·2 parts per 100,000, as compared with amounts ranging from 25 to 36 parts per 100,000 in the old supply.

The analysis of the solid matter shows the following:—

Calcium (Ca)	0·83	parts per 100,000.	
Magnesium (Mg)	0·22	"	"
Iron (Fe)	0·08	"	"
Silicates as SiO_4	0·58	"	"
Chlorides as Cl	0·90	"	"
Sulphates as SO_4	0·68	"	"
Carbonates as CO_3	1·26	"	"
Peaty and other undetermined matter ...	2·25	"	"
Total ...	6·80	"	"

When the water first arrived from Wales it contained a considerable amount of yellowish-brown colour, amounting to red 3 parts, yellow 8 parts, and blue 1 part on a tintometer scale. This colour has diminished in tint, till it is now represented by red ·6 part, yellow 2·6 parts, and blue 0·2 part. Most of the soft waters supplied to large towns have the power of dissolving lead to a greater or less extent. It has been found that the extent of this action is for practical purposes due to the acid peaty matter which the water contains. The Welsh water is, however, alkaline to lacmoid, and does not differ materially from our old supply in its plumbo-solvent ability. It may be said that every pure water has a slight action on lead, pure rain-water being especially active in this respect. The samples which have been taken from lead-lined cisterns and pipes during 1904 have so far indicated that there is an absence of lead in solution in amounts which would cause injury even to people who have a special idiosyncrasy to lead.

While there is no special power to dissolve lead, there is a power in the original Welsh water of eroding lead. This, however, is neutralised by the passage of the water through the aqueduct to Frankley. When, however, the amount of water sent from Wales is greatly increased, it may be necessary to add a grain or two of chalk per gallon in order to correct this erosive power, as is done in a number of other towns, should it be found that the hardening agency of the aqueduct is insufficient to neutralise the larger quantity.

OBITUARY.

THE RIGHT HON. EARL FORTESCUE.

By the death of Earl Fortescue the Institute has lost the last of the Vice-Presidents elected at the incorporation in 1888.

Earl Fortescue was one of the earliest members of The Royal Sanitary Institute, having been elected a Member in 1878, and made a Vice-President in 1880. In the same year he presided over the Provincial Congress held by the Institute in Exeter.

Born in 1818, he was the eldest son of the second earl by his first wife, Lady Susan Ryder, daughter of the first Earl of Harrowby. Educated at Harrow and at Trinity College, Cambridge, he left college in 1839 to become private secretary to his father, then Viceroy of Ireland. In 1841, as Viscount Ebrington, he contested Plymouth, and with Mr. T. Gill, his colleague, was elected. On the resignation of Sir Robert Peel, after the repeal of the Corn Laws, Lord Ebrington was appointed a Lord of the Treasury in the Government of Lord John Russell. In 1854, Lord Ebrington was elected for Marylebone, the borough in which the Institute is situated, and in 1857 the same constituency elected him again without opposition.

Lord Ebrington became well known through his humanity and benevolence towards the British soldier. After the Crimean war he visited the hospitals of the wounded soldiers and alleviated their condition as much as possible. He contracted ophthalmia in one of these hospitals. Serious illness followed, and he was for two or three winters compelled to resort to Madeira. The disease deprived him of one eye, permanently injured the other, and so much affected his health as to compel him to retire from the House of Commons. In 1858, as the result of his visits to military barracks and hospitals, Lord Ebrington brought forward a series of resolutions in the House of Commons, which were adopted, with a view to sanitary reform in the Army. He was called to the Upper House in his father's barony of Fortescue on December 5th, 1859. He succeeded to the earldom of his father on September 14th, 1861.

In his native county of Devon, the late peer was closely identified with educational and local government questions. Another subject upon which

he held strong views was that of the housing of the working classes. On this subject he delivered numerous lectures and was the author of several pamphlets.

For many years he was conspicuous as a member of quarter sessions, and was one of its chairmen. He earnestly supported Dr. Temple, then Bishop of Exeter, in establishing the Diocesan Conference, and at its early gatherings was a frequent speaker on educational and social subjects.

Lord Fortescue married on March 11th, 1847, Georgiana Augusta Charlotte Caroline, eldest daughter of Col. Dawson-Damer, C.B. By her (who died in 1866) he had issue seven sons and seven daughters, of whom four sons and five daughters survive. His eldest son, Viscount Ebrington, who succeeds to the title, was born in 1854, has represented Tiverton and West Devon in Parliament, and is Lord-Lieutenant of Devonshire and A.D.C. to the King.

Lord Fortescue frequently attended and presided over meetings of the Institute, and personally took part in its work, besides aiding in the furtherance of several matters affecting the Institute coming under the notice of Parliament.

Although his failing health had prevented his taking an active part in the meetings for several years, he had been present at the Council of the Institute as late as January 28th, 1901, and had sent communications to the Council up to last year.

The loss of his cordial and friendly support will be deeply felt in the work of the Institute.

J. L. N.

NOTES ON LEGISLATION AND LAW CASES.

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WATER SUPPLY TO ADJOINING DISTRICT.—*Sanction of Local Government Board—Particular area—Penalty-clause—Public Health Act, 1875 (38 & 39 Vict. c. 55), ss. 61, 174. On appeal. (See Journal, Vol. XXVI., Nos. 1–3, p. 192.)*

The C.A. held that under s. 61, the Local Government Board had power to give a limited sanction, namely, to sanction a supply of water by one local authority to a specified area of the district of an adjoining local authority. This was what had been done in the present case. The Local Government Board had only sanctioned the supply of water by the plaintiffs to the parishes of East and West Ardsley, and an agreement for the supply of water to a larger area of the same district required the sanction of the Local Government Board. This sanction had never been given to the agreement of Jan. 31, 1895, and consequently that agreement was invalid, as indeed was provided by clause 9. The plaintiffs were, therefore, thrown back upon the earlier agreements of July 17, 1882, and Sept. 29, 1885.

The defendants then took the objection that those agreements were invalid, because they did not contain a penalty-clause in accordance with s. 174, sub-s. 2. of the Public Health Act, 1875.

The Court affirmed the decision of Swinfen Eady, J., on this point.

Romer, L.J., was of opinion that sub-s. 2 of s. 174 is directly only, not imperative, and that the omission of a penalty clause did not render the contract invalid.

Stirling, L.J., agreed with Romer, L.J.

Vaughan-Williams, L.J., differed, being of opinion that the provision of s. 174, sub-s. 2, was imperative.

The decision of the questions of the form of the judgment to which the plaintiffs would be entitled and how the costs should be borne was postponed to the Michaelmas Sittings.

SOOTHILL UPPER URBAN DISTRICT COUNCIL *v.* WAKEFIELD RURAL DISTRICT COUNCIL *and* URBAN DISTRICT COUNCIL OF ARDSLEY, EAST AND WEST.

C.A. (1905) W.N. 138.

SEWERS.—*Drain—"Single private drain"—Sewer draining several houses of same owner into single private drain—Local government—Public Health Act, 1875 (38 and 39 Vict. c. 55), ss. 4, 41—Public Health Acts Amendment Act, 1890 (53 & 54 Vict. c. 59) s. 19.*

The respondent was summoned in default of payment of £49 in respect of expenses incurred by the appellants, as the local sanitary authority, in executing repairs to a drain. The respondent was the owner of six houses in a row of sixteen houses, the other ten belonging to different owners. The drainage of the sixteen houses was conveyed to a public sewer in a street by means of a system of pipes arranged as follows: Each pair of houses was drained by a separate pipe into a pipe common to both houses; each common pipe discharged into a line of pipes laid in private ground behind, and parallel to, the row of houses; the respondent's houses were connected with the line of pipes by three such common pipes: the line of pipes drained into the said public sewer. It was admitted by the appellants that each common pipe was a sewer within the meaning of the Public Health Acts. A written complaint was made to the appellants by their inspector of nuisances under s. 41 of the Public Health Act, 1875, that the line of pipes draining the row of houses was a nuisance, and they caused the same to be inspected, when it was found to be defective and require amendment. Thereupon notice was served upon the respondent and the other owners to do the necessary works. This notice was not complied with, and the appellants caused the work to be done. The appellants' surveyor apportioned the cost, pursuant to s. 19 of the Public Health Acts Amendment Act, 1890. among the owners of the sixteen houses, the amount apportioned on the respondent being £49. The respondent refused to pay, contending that the line of pipes was a sewer and not a single private drain within s. 19. The Justices held that the line of pipes was not a single private drain within s. 19, and dismissed the complaint:—

Held, that, inasmuch as the common pipes connecting the respondent's houses with the line of pipes were sewers, the line of pipes was not a single private drain within s. 19 of the Public Health Acts Amendment Act, 1890.

WOOD GREEN URBAN DISTRICT COUNCIL *v.* JOSEPH.

Div. Ct. (1905) W.N. 144.

lume XXVI. No. 11. Issued December, 1905.

JOURNAL
OF
HE ROYAL SANITARY INSTITUTE

THE ADMINISTRATION OF THE F... AND DRUGS ACTS: A REVIE...

THE NEW YORK PUBLIC LIBRARY. ASTOR, LENOX AND TILDEN FOUNDATIONS

By A. WELLESLEY HARRIS, M.R.C.S., D.P.H.,
Medical Officer of Health, Lewisham.
(FELLOW.)

PART II.*

PRESERVATIVES.

UNTIL within comparatively recent times, foods were preserved by the addition of such substances as oil, spirits of wine, vinegar, salt, sugar, etc.; but with the development of knowledge that *ferments* were responsible for putrefaction or decomposition in food materials, it became known that the action of these ferments could be controlled and retarded by cold and heat, which are now largely employed in preserving food. The rapid progress of chemistry has brought to light the existence of many chemical substances which inhibit the action of ferments. It is not, therefore, a matter of surprise that attempts should be made to preserve food by their use. Some chemical agents were found to render the food unpalatable, and had to be discarded. Those in general use at present are boric acid, largely used in preserving milk and cream, ham, bacon, sausages, and meats; salicylic acid, employed chiefly in beverages; and formalin (40 per cent. solution of formic aldehyde), a preservative of more recent date, which has been largely used for milk.

Chemical preservatives are undesirable, and some of them are injurious to those consuming food containing them. The addition of boric acid to milk leads to digestive troubles among consumers, of whom infants and invalids suffer most. It is usually added to milk by rule of thumb, and it is not uncommon to find that the amount added equals from eight to twelve grains per pint. It at once becomes obvious how large a dose an infant may be compelled to take in the course of a day. The addition of

* Part I. of this Article appeared at page 469.

boric acid to butter does not appear to be so serious, for the reason that, compared with milk, only a small amount of butter is consumed. From the evidence submitted to the Departmental Committee on Food Preservatives, it would appear that it was the practice among manufacturers to use from a half to one per cent. of boric acid in butter. There is little to fear if the amount does not exceed 0·5 per cent., which would equal, roughly, one grain of boric acid in one ounce of butter.

Formalin has a remarkable effect upon animal tissues. Even in a weak solution it coagulates albumin and other proteids, and an extremely weak solution hardens proteids and renders them less digestible. The presence of formalin in the stomach inhibits the action of the gastric ferments, and must be considered as poisonous. In samples of milk preserved with formalin, quantities varying from one to ten parts in 100,000 have been reported.

COLOURING MATTERS.

Colouring matters or dyes are generally used to mask the inferior quality of the article. Their addition to milk is practised by even the best firms to meet the wishes of their customers, it being a popular, though erroneous, idea that yellow milk is a far superior article.

Aniline dyes are used for colouring temperance drinks, jams, sweets, confectionery, and table jellies, and also to colour beet sugar in imitation of Demerara.

Annatto is employed for colouring dairy produce, and the use of aniline dyes is also becoming common for this purpose.

Red oxide of iron is sometimes used for colouring potted meats, sausages, and sweets.

Sulphate of copper is used for preserving the green colour of canned peas. Amounts varying from 2½ to 6 grains in the lb. have been found.

The Departmental Committee made the following recommendations with regard to the use of preservatives and colouring matters:

That the use of formaldehyde or formalin in food and drinks be *absolutely* prohibited;

That salicylic acid be not used in greater proportion than 1 grain per pint in liquid food, and 1 grain per pound in solid food; its presence in all cases to be declared;

That the use of any preservative or colouring matter whatever in milk offered for sale in the United Kingdom be constituted an offence under the Sale of Food and Drugs Acts;

That the only preservative which it shall be lawful to use in *cream* be

oric acid not exceeding 0·25 per cent.; the amount to be notified by label pon the vessel;

That the only preservative permitted to be used in butter or margarine e boric acid or mixtures of boric acid and borax in proportions not exeeding 0·5 per cent., expressed as boric acid.

That in the case of all dietetic preparations intended for the use of ıvalids or infants chemical preservatives of all kinds be prohibited;

That the use of copper salts in the so-called greening of preserved oods be prohibited.

MARGARINE.

Definition.—Under the Margarine Act the words "margarine" or margarine cheese" mean all substances prepared in imitation of butter r cheese and not made exclusively from milk and cream. Such subtances must be sold under the name of margarine or margarine cheese.)ffenders are liable to a penalty of £20. (Sections 3 and 4, Margarine Act, 1887.)

The Margarine Act only related to substances made in imitation of utter, and the provisions of this Act were extended by section 5 of the Food and Drugs Act of 1899, so as to include margarine cheese under the rovisions of the former Act.

Marking.—Every package, whether open or closed, containing marzarine or margarine cheese must be branded on top, bottom, and sides vith the words MARGARINE or MARGARINE CHEESE in capital etters not less than ¾-inch square. If such margarine or margarine heese be exposed for sale in a retail shop, it must have attached to its ulk, so as to be *clearly visible* to the purchaser, a ticket or label, the etters of which shall be not less than 1½-inch square. Every portion old by retail shall be wrapped in paper having clearly visible a label earing the words "margarine" or "margarine cheese," the letters to be -inch long, and distinctly legible. No other matter shall appear on the vrapper. (Sec. 6, Margarine Act, 1887; secs. 6 and 27, Food and Drugs Act, 1899.)

All margarine or margarine cheese imported into the United Kingdom nust be contained in packages conspicuously marked, as must also cases ontaining the same substances whenever forwarded in Great Britain by ublic conveyances.

An authorised food and drugs inspector may procure in transit a sample rom any package for analysis if he have reason to believe that the provisions of the Margarine Act are being infringed. (Sec. 8, Margarine Act; sec. 10, Food and Drugs Act, 1899.)

All premises used for the manufacture of, and for wholesale dealing in, margarine and margarine cheese must be registered with the local authority by the owner or occupier. The local authority must forthwith notify such registration to the Board of Agriculture. (Sec. 9, Margarine Act, 1887; sec. 7, Food and Drugs Act, 1899.)

Every occupier of such a manufactory, and every wholesale dealer in such substances, shall keep a register showing the quantity and destination of each consignment sent out from his factory or place of business. The register shall be open to the inspection of the officers of the Board of Agriculture. (Sec. 7, Food and Drugs Act, 1899.)

A food and drugs inspector duly appointed may, *without purchasing*, take for the purpose of analysis samples of butter or any substance purporting to be butter *exposed for sale* and *not marked "Margarine."* Any such substance not so marked shall be presumed to be butter. The division of the sample and other details must be carried out in the usual way. (Sec. 10, Margarine Act, 1887.)

LIMIT OF BUTTER FAT IN MARGARINE. It is unlawful to manufacture, import, sell, or expose for sale margarine containing more than 10 per cent. of butter fat. (Sec. 8, Food and Drugs Act, 1899.)

PRINCIPAL OFFENCES.

The mixing of any injurious ingredients with any article of food or drug sold or intended to be sold. (Sec. 3 and 4, 1875 Act.)

This section is very stringent, and provides for a penalty not exceeding £50 for a first offence and imprisonment on a subsequent conviction. Prosecutions are rarely instituted under this section, possibly because the practice of adding injurious materials is now infrequent, or that it is necessary for the prosecution to incur heavy expense in obtaining scientific and professional witnesses to support the indictment that the material added is injurious to health.

Another difficulty arises from the fact that no person can be convicted under either Section 3 or 4 if he can prove to the satisfaction of the Court that he did not know, or that he could not with the exercise of reasonable diligence have known, that the injurious substance, in respect of which the proceedings were taken, had been added to the article of food.

An interesting illustration of this defence occurred recently at the Tower Bridge Police Court, when a milkseller was charged with selling milk containing ten parts of formalin in 100,000 parts of milk (an unusually large proportion).

The defence admitted that milk containing the preservative had been

sold, but proved that the seller could not possibly have been aware of it, and the magistrate dismissed the case without hearing further evidence.

In the report of the Departmental Committee of 1901 an expression of opinion based upon the evidence before the Commission is given with regard to formaldehyde as follows:—"In its concentrated form the solution of formaldehyde is a very potent and even poisonous substance."

Sale by any person of articles of food and drugs not of the proper nature, substance, and quality demanded, to the prejudice of the purchaser. (Section 6, 1875 Act.)

It is under this section that most proceedings for adulteration are taken. The master is responsible for the act of his servant, *i.e.*, the person selling the article.

Selling compounded articles of food or drugs not composed of ingredients in accordance with the demands of the purchaser, unless the article so sold bears a label denoting that the food or drug is sold as a mixture.

A label is not a protection where the admixture has been fraudulently made. (Sec. 7 and 8, 1875 Act.) The notice of the mixture given by the label must not be obscured by other matter. (Sec. 12, 1899 Act.)

A printed or written label is not the only legal form of disclosure. Verbal notice at the time of purchase that the article is not of the nature, substance, and quality of the article demanded is sufficient. The display of a notice in the bar of a public-house to the effect that all spirits are sold diluted is a protection to the seller.

Abstraction of part of an article of food before sale, without notice of such abstraction. (Sec. 9, 1875 Act.)

This section was intended to make the removal of cream from milk a punishable offence.

Refusing to sell to any officer any article of food or drug. (Sec. 17, 1875 Act.)

The officer must tender the price of the article demanded by him. In the case of refusal he should make himself known and show his written authority. The penalty for an offence is £10.

False Warranty. (Sec. 20, 1899 Act.)

Any person giving a *false* warranty in writing is liable to a fine of £20 for the first offence, and £50 for the second.

Obstruction at place of delivery. (Sec. 4, 1899 Act.)

Any seller, consignor, or any person or persons entrusted by him with the charge of milk at the place of delivery who refuses to allow an officer *to take* a sample for the purpose of analysis is liable to a penalty of £10.

Name and Address of Vendor on Vehicle, etc. (Sec. 9, 1899 Act.)

Any person selling milk or cream in any highway or place of public resort must have his name conspicuously inscribed upon the vehicle *or* receptacle.

Obstructing officer in discharge of his duties. (Sec. 16, 1899 Act.)

Any person who wilfully obstructs or impedes any officer in the course of his duties under the Food and Drugs Acts, or who offers bribes, gratuities, or other inducements to prevent the due execution of his duties under the said Acts, is liable to a fine of £20.

PROSECUTIONS.

The analyst's certificate should be sent to the inspector who obtained the sample. If the article referred to therein is adulterated, the local authority will give instructions for a prosecution. The inspector should prepare his evidence in writing, being careful to give in detail all conversation (if any) which took place between the vendor and himself at the time of purchase. He should never fail to include in his report any *disclosure* made by the vendor, and whether it took place *before* or *after* the completion of the purchase. He must act in perfect fairness.

An information must be laid before a magistrate within twenty-eight days of the taking of the sample. It must contain the particulars of the offence alleged. The magistrate may grant a summons, returnable in not less than fourteen days. The summons must also contain particulars of the offence alleged. It is necessary to serve upon the defendant, with the summons, a copy of the analyst's certificate. The majority of prosecutions are taken under section 6 of the Act of 1875.

PRODUCTION OF SAMPLE RETAINED BY INSPECTOR.—The portion of the sample which has been retained by the inspector must be produced at the hearing. Failure to do so has frequently proved fatal to a conviction. This sometimes is unavoidable when bottles containing samples of milk have burst owing to fermentation, and several cases have been dismissed in consequence.

DEFENCES.

WARRANTY.—A defendant is entitled to be discharged if he can prove to the satisfaction of the magistrate that he bought the article demanded of him by the prosecutor with a written warranty and that he sold it in the same state as he purchased it. (Sec. 25, 1875 Act.)

The Select Committee on Food Products Adulteration reported that "there is a class of cases in which your Committee think defendants should be debarred from pleading a warranty defence." They referred to the cases in which a warranty is given by a *foreign* manufacturer or dealer.

This advice was acted upon in passing the Act of 1899, section 20 of which supplements the provisions of section 25 of the 1875 Act referred to, in that a warranty or invoice is not available as a defence unless the defendant has within seven days of the service of the summons sent to the purchaser a copy of such warranty or invoice, with written notice stating that he intends to rely on the warranty or invoice and specifying the name and address of the person from whom he received it. A like notice must be given to the person giving the warranty or invoice. A warranty or invoice given by any person resident outside the United Kingdom is not available as a defence unless the defendant proves that he has taken proper steps to ensure its accuracy.

It must be remembered that the defendant must prove to the satisfaction of the magistrate that he sold the article exactly as he received it. It is frequently the practice of large milk dealers to mix milk from various sources, and for this reason it would be impossible in a prosecution for adulteration to prove that the sample was sold as received.

The question of warranty is an important one, and if the defendant is discharged in consequence of it, the prosecution *may* proceed against the person giving the warranty in a Court having jurisdiction in the place where the sample to which the warranty relates was purchased. But it will possibly be found that the farmer will in his turn produce a warranty from one or more other farmers, and so the prosecution fails.

The Select Committee already referred to had it suggested to them by several witnesses that a warranty should cease to be a defence, and that the retailer should himself take action against the person giving it. The adoption of such a suggestion would no doubt put the retailer to considerable trouble and expense, and the Committee saw no reason for adopting the suggestions. There is less objection to the suggestion that the retailer should be required to join the giver of the warranty with himself as *co-defendant* in the original prosecution. There seems to be a general opinion that the givers of warranties have too frequently escaped the responsibilities for adulteration for which they were accountable. Such a condition of things may be due to the apathy of local authorities to incur further expense in regard to a case where they may again be defeated by the production of further warranties. It must be remembered that a mere invoice is not a *warranty*, and therefore is not admissable as a defence in prosecutions under the Food and Drugs Acts. This, however, does not apply to margarine prosecutions, where an invoice (not being a warranty) is admitted as a defence. (Section 7, Margarine Act.)

OTHER DEFENCES.—A descriptive label given at the time of sale with

a package containing a mixture is a *good* defence except when a substance *injurious to health* has been added.

Verbal notice of mixture *before* completion of purchase.

A placard exhibited in the shop, that the article sold was the same in nature, substance, and quality as the article demanded.

That the ingredient added to the article of food was *not* injurious to health. Proof of this fact must rest with the defendant.

That the ingredient added to the article was required for the preparation thereof as an article of commerce.

That the article sold was not sold to the *prejudice* of the purchaser.

In 1877 the High Court of Justiciary, in the case of Dandson *v.* McLeod, held that a purchase made by an inspector for analysis and not for consumption could not be to his prejudice. In Hoyle *v.* Hitchman, 1879, the Queen's Bench Division took the opposite view. The point is now settled by Section 2 of the Act of 1879 which provides that in the case of adulterated articles it shall be no defence to allege that purchase for analysis was no prejudice to the purchaser.

The *unavoidable* admixture of a foreign ingredient is sometimes claimed as a defence. For instance, pepper may contain a small amount of unavoidable mineral matter. Any excess over the amount ordinarily found should be deemed an adulteration.

A label or disclosure of mixture is no defence where the mixture is *fraudulent.* In Liddiard *v.* Reece, 1880, the inspector asked for coffee and was given a packet with a label showing it to be a mixture of coffee and chicory. On analysis the sample was found to contain 40 per cent of coffee and 60 per cent. of chicory. The magistrate held that the chicory had been added fraudulently to increase the weight of the coffee and that the label was therefore no protection, and convicted the defendant. This decision was upheld by the High Court.

Objection to the analyst's certificate is sometimes raised upon one of the following grounds:—

(*a*) That the *weight* of the article is omitted from the certificate: if the article can be conveniently weighed the weight should be stated on the certificate.

(*b*) That in the case of articles liable to decomposition, no statement appears on the certificate to the effect that no *change* has taken place in the constitution of the article which would interfere with the analysis.

(*c*) That the analyst has not stated whether the ingredients or materials mixed are or are not *injurious to health.*

In a certificate of analysis relating to a sample of milk the analyst

stated "the sample was fresh when delivered." The Court of Quarter Sessions held that the certificate was informal.

The constituent parts of a sample must be stated on the certificate, and where possible, the *data* upon which the analyst arrives at his opinion, so as to enable the magistrate to form an opinion also. Several prosecutions have failed where these details have been omitted.

FOOD STANDARDS.

The existing standards relate to milk, skimmed milk, butter, and drugs.

The Board of Agriculture, by virtue of section 4 of the 1899 Act, have power to make regulations with regard to milk, cream, butter, and cheese.

The following regulations have been made :—

The *Sale of Milk Regulations*, 1901, which provide that milk containing less than 3 per cent. of milk fat, and 8·5 per cent. of solids not fat, and skimmed or separated milk containing less than 9 per cent. of solids not fat, are to be presumed not genuine;

The *Sale of Butter Regulations*, 1902, by which butter containing more than 16 per cent. of water is to be presumed not genuine.

DRUGS.—The standard for drugs is the British Pharmacopœia, which, however, gives the method of preparation only, and no standard for the finished article.

In Hudson *v.* Bridge, 1903, the article sold was vinegar of squills. It contained 2·5 per cent. of acetic acid. When freshly made it should contain 4·27 of acetic acid; but the magistrate dismissed the case by reason of the fact that no standard for the finished article was contained in the Pharmacopœia.

The question of fixing standards for other articles of food has been advocated by many, and approved by others.

The Select Committee, after hearing evidence, reported that "the adoption of standards other than those which represented the composition of the best description of commodities might operate as inducements to the manufacturers and producers of such commodities to degrade the composition of their productions to the point at which they would satisfy the standard." This opinion was expressed in the report issued in 1896. The practice of reducing high quality milk by the addition of separated milk appears to be increasing since a standard was fixed in 1901, and confirms the fear expressed by the Select Committee.

A Departmental Committee was appointed in 1901 to consider the desirability of fixing a standard for butter. A standard has been suggested in their report, but so far it has not been adopted.

THE HEALTH OF THE WORKERS EMPLOYED IN THE BOOT AND SHOE INDUSTRY.

By CHARLES FRANCIS WRIGHT,
H.M. Inspector of Factories.

Read at Sessional Meeting, Northampton, November 4th, 1905.

I AM very pleased to open this discussion on "The Health of the Workers Employed in the Boot and Shoe Industry," knowing that it will bring me in close touch with those whose duty it is to share with H.M. Inspectors of Factories the responsibility in administering the law framed for the protection of all workers in the factories and workshops in this country.

The Public Health Acts and the Factory Acts are so closely allied by recent legislation that they are in many instances working as one Act, especially in regard to workshops.

The industry under review is carried on partly in factories and partly in workshops, and also, to a small extent, is still a home industry.

A factory, as defined by the Factory Act, 1901, is any premises where mechanical power, a steam engine or gas engine, for instance, is used in aid of the manufacturing process.

A workshop is any premises wherein any handicraft is carried on and no mechanical power is used.

In discussing our subject it may be well if we consider the gradual growth of legislation from the time when work-places of this description were first regulated by Act of Parliament down to the most recent Act passed in 1901.

The first Act passed by the Legislature was known as the Workshop Act, 1867, and was to be administered in conjunction with the Sanitary Act of 1866 by the local sanitary authorities. Taken together their provisions were of a sanitary nature, and the hours of work of children, young persons, and women were not to exceed a certain limit. Fixed times were to be allowed for meals and rest; no child was to be employed

before the age of eight years, and no young person to be employed full time under the age of thirteen years.

Owing to the failure on the part of the local sanitary authority to carry out the satisfactory administration of this Act, in 1871 a new Act was passed, which placed the administration of the 1867 Act in the hands of H.M. Inspectors of Factories.

This Act was followed by the great Act of 1878, which, at the time it became law, was considered a very perfect piece of legislation. It was a consolidating Act mainly, but carefully laid down that factories and workshops should be lime-washed every fourteen months, that no overcrowding should be allowed, that ventilation of a suitable character should be provided, that the hours of work should be fixed for all women, young persons, and children, with certain times for meals and rest. That all persons employed under sixteen years of age in factories must be examined by an appointed surgeon, and certified as to their fitness for employment within seven days of their first commencing to work. No child under ten years of age to be employed. That where injurious dust was produced in any process, and was inhaled to an injurious extent, ventilation by a fan should be provided. Also under this Act a factory inspector was empowered to take into a factory or workshop a medical officer of health or other officer of the sanitary authority respecting the neglect or default in relation to any drain, water closet, privy, or water supply.

The next Act of Parliament of any importance to the boot and shoe industry amending and improving this 1878 Act was the Act of 1891. This enactment placed the workshops so far as their sanitary condition was concerned under the local authorities' care, but should they fail to carry out their duties in this respect, then the Secretary of State could authorize the factory inspector to take the necessary action and charge the sanitary authority with any expense incurred. It raised the age of first employment for children from ten to eleven years of age and forbade the employment of women within four weeks of having given birth to a child. The Secretary of State was also empowered to make an order (which was done) requiring that all manufacturers and contractors should keep a list of out-workers. This list, showing the names and addresses of all persons employed by them outside the factory or workshop, to be open to inspection by the inspector of factories and any officer of the sanitary authority. Further amendments were added to the main Act, 1878, by an Act passed in 1895 as follows:—

Section 6 provided that no wearing apparel should be made on any premises wherein any person was suffering from scarlet fever or smallpox.

Section 32 provided adequate measures should be taken for securing

and maintaining a reasonable temperature in each work-room while work is carried on.

Section 35 provided that an inspector of factories in any district wherein the Public Health Act 1890, Section 22, was not in force, respecting the provision of suitable and separate sanitary accommodation for persons of both sexes, could take the same proceedings as any sanitary authority could do if this portion of the Public Health Act applied.

All these excellent enactments dating from 1878 to 1895 are now embodied in the great consolidating Act of 1901 which in conjunction with the Public Health Acts 1875 to 1890 form at the present time the regulations for the protection of the workers in this large industry.

From the above view of the various Acts of Parliament which have been passed since the first Act of 1867 the gradual growth of legislation for the protection of the health of workers employed in these factories and workshops will easily be traced, and it will be seen that legislation has now laid down the following regulations and matters to be attended to:—

1. Cleanliness and lime-washing of workrooms.
2. Sufficient ventilation and air-space.
3. Specified ages of first employment for children and young persons.
4. As to the hours of work for women, young persons, and children, and specifying that certain times shall be allowed for meals and rest.
5. As to the provision of suitable and separate sanitary accommodation for persons of both sexes and the provision of efficient drainage.
6. That workrooms shall be kept at a reasonable temperature.
7. That any injurious dust produced in the course of any process shall be removed by mechanical means.
8. That no wearing apparel shall be made in any infected premises.
9. That lists of outworkers, with their addresses, shall be kept, and these to be open to inspection by sanitary officers and factory inspectors.
10. That no woman shall be employed within four weeks after she has given birth to a child.

To enable us to more carefully discuss our subject, it may be well to describe as briefly as possible the various sections of manufacture of a boot as it is made at the present day. It will be clearly understood that I am dealing with the ordinary boot of everyday sale, as it is made by the thousand in the factories and workshops of this country.

The first process in the manufacture of a boot is the "clicking," which consists in cutting out the various portions of the upper from the skin after it leaves the hands of the currier. It is in nearly all instances done by hand, the operative standing at a bench and using a short hand-knife for the purpose. The clicking-room is, as a rule, separate and distinct from other portions of the works, and ample air-space is provided, but the supply of fresh air is not quite so plentiful as one could sometimes wish, although sec. 7 of the 1901 Act requires that the occupier of the factory shall maintain sufficient ventilation. I am afraid this, in most instances, is due to the workers themselves, and partly (in cold weather) to the temperature of the room being kept too low for comfort. It is decidedly a sedentary occupation.

After the leather has been cut into the desired shape by the "clicker," it is passed on to the "closer" whose duty it is to sew the pieces together to form the boot upper. This closing is done by women and girls, and with very few exceptions with the aid of a sewing machine. These sewing machines are being actuated by power more and more every day, although, even in the neighbourhood of Northampton, much work is still done on the treadle-machine by persons in their own homes. The days of the treadle in my opinion are numbered, as it certainly cannot compete with a power-machine. In the closing-room of a factory it is nearly impossible to get overcrowding as defined by the Factory Act (less than 250 cubic feet for each person), and I may say it is rarely if ever met with; but in workshops, especially with low roofed rooms, it is reported occasionally. Anæmia is sometimes noticed among the workers, but, taken as a whole, they are a fair specimen of the women-workers of this country. Ventilation could be more efficient in this department.

The next portion of the boot to receive our attention is the sole and heel. The sole is cut out from the hide by a knife having the necessary shape. This knife being forced through the leather by a press: in factories the press is driven by power and in workshops by treadle. From my personal observations I consider this portion of boot-making one of the healthiest. There is plenty of exercise for the workman in lifting about the hides and ample air-space, and it certainly cannot be classified as a sedentary occupation. Heel making, or "heel building" as it is termed in the trade, is carried on in factories on very similar lines to sole cutting. The work is carried on to some large extent in country districts, the heels being cut from scrap made in sole cutting. Where power is not used the sections of the heel are cut by the leather being placed on a knife which is fixed on a firm bench with the cutting edge

upwards and the leather hammered through by a wooden mallet, consequently where many people are engaged in one room there is much noise. The work is performed by boys and girls generally, and although I have not made any tests I should not be surprised to learn that these people suffered from deafness similar to boiler makers and rivetters.

Having now the upper and sole and the heel of the boot, the upper must be attached to the sole, or properly speaking in a machine-made boot to the two soles, the insole and the sole proper. There are two ways of doing this now in common use, one by rivetting and lasting by hand and the other by sewing with the aid of a sewing machine specially designed for the purpose. This work is done by men and is technically known as "making," the operative in each system standing to his work. In the rivetting system the men have a habit of holding the pins or nails in quantity in their mouths, and as they require them to drive into the sole of the boot take them one by one between the finger and thumb of the left hand from the mouth. To an onlooker this appears to be a very bad system and it must certainly use up a large quantity of saliva. For the attaching of the heel a special machine known as a heel attacher has come rapidly into use, boy labour being employed.

We now have the boot practically made and it remains only to be finished. This finishing consists in paring the edges to a symmetrical shape, scouring, staining and polishing the sole and heel. Where this is done by machinery, revolving knives, emery wheels, glass paper and circular brushes are employed as agents, the men known as "finishers" standing at their work and holding the boot about breast high in front of them. Much dust, mainly composed of fine particles of leather, brass and iron, is generated in the process and is removed by a fan connected by piping with a hood over the point of the machine where the generation of the dust takes place. Although every machine of this class has this apparatus for dust removal fitted, the efficiency in very many cases is much impaired by faulty construction and design of both fan, pipes, and dust receiver. Sufficient attention is not paid in the majority of cases to keeping the pipes clear and the joints tight.

When boot finishing is done by hand the operative is seated on a low stool facing a low bench on which he places his tools which consist of knives of various patterns, glass paper, burnishers, a smoky lamp, burning either gas or oil, and some mixed staining, generally wet. He trims the edges and scours the sole and heel with glass paper, stains and then polishes with the aid of the burnishers, which are kept hot by the abovementioned lamp.

Neither machine finishing nor finishing by hand can be considered a healthy employment. The dust in the first case is very objectionable, and the cramped position in the latter combined with the dust produced in scouring the sole must be detrimental to health. Dr. Oliver, in his work on "Dangerous Trades," gives an instance of deformity which was very prevalent in workers in this industry, and which applies to hand finishers. He says, "as a consequence of the repeated pressure applied to the front of the chest, especially in younger men, the chest bone and ribs were driven in so as to form a hollow. This chest being known as the boot-makers' chest." Finishing by hand is gradually giving way to machinery, and if only more attention is given to efficient dust removal, finishing by machinery can, in my opinion, become a much more healthy trade.

In hand finishing several instances of lead poisoning have been known to occur owing to the material used in staining consisting of compounds of lead. This has been remedied by the substitution of other mixtures, generally vegetable substances.

According to the last return published by the Home Office as a supplement to the Chief Inspector of Factories' Report for 1900, the number of factories in the United Kingdom in which this industry was carried on was 1,195, and the number of persons employed was, males 68,041, and females 28,337. A return for workshops is not available.

The introduction of power-driven machinery during the last few years has undoubtedly been of great benefit to the worker: it has made him more regular and systematic in his habits, and has required manufacturers to build new factories on the most modern lines fitted with the latest sanitary appliances, affording ample air-space and excellent ventilation.

With respect to ventilation in factories and workshops much valuable information is contained in the first report of the Departmental Committee appointed by the Home Secretary in 1900 to inquire into the ventilation of factories and workshops. The results of air analyses taken by them by means of the Haldane apparatus are widely different in some workshops as compared with others. In one in Whitechapel, 8·8 volumes of CO_2 per 10,000 volumes of air were found, and in another in Gloucestershire, 34·0 volumes of CO_2 per 10,000.

This Committee considers that under ordinary circumstances 10 volumes of CO_2 per 10,000 volumes of air should not be exceeded unless gas is burning and suggest that a standard limit of CO_2 should be fixed by order of the Secretary of State.

THE MORTALITY STATISTICS OF BOOT AND SHOE WORKERS IN NORTHAMPTON.

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(MEMBER.)

Read at Sessional Meeting, Northampton, November 4th, 1905.

I HAVE found considerable difficulty in preparing this paper, chiefly on account of a good deal of indefiniteness in the terms used by shoeworkers in describing either themselves or their relatives, both at the census and to the registrars of births and deaths. It seemed to me desirable, nevertheless, that an attempt should be made in order that this meeting should have definite facts before it, and that the discussion should not go on general impressions which have not been put to the touchstone of figures. The figures which are now in your hands can be considered only more or less close approximations to the facts, but nevertheless I believe I am justified in considering them accurate to such a degree that the main inferences from them are not vitiated by the errors which may be unavoidably present.

After the completion of the last census enumeration, the various Authorities were informed that they could obtain further information with respect to the areas which they controlled on application, if they would pay for the expense of eliciting this information. On my advice the Northampton Council obtained a considerable amount of information on the numbers and ages of shoe workers in the town, and it is on the figures so obtained that the tables I have drawn up are based.

The classes into which the trade was divided by the census authorities are as follows:—clickers, closers, rough stuff, etc., pressmen, pump makers, lasters, finishers, handsewn bootmakers and cordwainers, rivetters, machinists, "operators," "boot and shoe makers," boot and shoe room hands, shoe bracers, knot-tiers, and a miscellaneous class, including ware-

housemen, cleaners, packers, etc. These classes are divided into male and female, and the numbers at various ages are given.

In trying to combine these classes with an analysis of the death returns certain difficulties at once showed themselves. There is a class of men who were known as boot-closers, but this branch of work is dying out, as it is derived from the pre-machinery days. It therefore seemed desirable to classify these with lasters, and I have therefore classified all male closers over forty-five with the lasting group. Knot-tiers, on the other hand, fell naturally into the closing group, which therefore is almost entirely composed of females. Machinists, again, are an undefined class, but it seemed clear that the male machinists were those who worked machines in the lasting-room and should therefore be included with lasters, while machinists properly so-called were entirely a female class.

Lasters as finally computed are perhaps the most miscellaneous class given. As furnished by the census there appeared to be only about 2,400 lasters to 2,800 finishers, whereas I am informed that the proper proportion is about seven lasters to four finishers. This was remedied by including the boot and shoemakers (so-called), most of whom probably did work which was really lasting or analogous to it. Again rivetters, hand-sewn bootmakers, and operators are all small classes, and their work seemed chiefly related to lasting; they have therefore been included in this group, which also includes, as explained above, male closers over forty-five, and all male machinists.

The miscellaneous group, as in the census returns, includes warehousemen, packers, cleaners, etc., and also boot and shoe-room hands.

In the final result seven classes were made, and the numbers, including both male and female, are as follows. It is to be noted that these figures differ from those in the later table for a reason which will be subsequently explained.

Clickers	1,521.	Lasters	5,779.
Closers	3,037.	Finishers	2,819.
Machinists	1,744.	Miscellaneous ...	699.
Rough-stuff and pressmen	612.	Total ...	16,211

I may be pardoned for digressing here to point out how nearly Northampton is a town of one industry, for the staple trade absorbs between one fifth and one sixth of its entire population of 87,021 (census, 1901).

The next element of the problem to be attacked was an analysis of the death returns, and here a great difficulty at once arose. The Borough of Northampton was extended at the end of 1900, and now includes a population of about 30,000 which does not reside within the limits of the old borough. It seemed that the best way to overcome this difficulty was to analyse the death returns for a period before the date of the amalgamation, which fortunately coincided roughly with the date of the census, and to calculate the results obtained on the figures for boot and shoe workers in the old borough, while the period since the amalgamation could be calculated on the census figures already given.

To make the results as harmonious as possible, periods of four years before and after the census were taken, so that the final result is calculated on an eight-year period. An advantage of the method is that the census figures could be used without further correction, and yet sufficiently accurate results obtained. Fortunately, the number of shoe workers had been obtained for the wards of the borough, and six of these corresponded fairly well with the old borough; the only wards where corrections had to be made were the North and St. Edmund wards, in which the figures were reduced by simple proportion, as I knew the total population which had been added to them at the extension.

The figures for the old borough are as follows:—

Clickers	1,171.	Lasters	4,367
Closers	2,355.	Finishers	2,127
Machinists	1,341.	Miscellaneous ...	521
Rough-stuff and pressmen	473.	Total ...	12,355

It would then have been a simple matter to calculate the death-rates, but it seemed important that these rates should be comparable with the rates for the whole borough, and with the rates for the country generally, as otherwise it would have been impossible to say whether any disease pressed with special force on shoe-workers. Here another difficulty arose, because the figures required by the Local Government Board in the annual reports of medical officers of health are divided into age groups, fifteen forming a dividing age, and shoe-workers begin their work at an earlier age.

The figures for the borough were not obtainable in these reports for the earlier ages, thirteen and fourteen; it became necessary, therefore, for purposes of comparison, to find the numbers in each of the classes who were aged fifteen and over, and on these to calculate the final results. Practically all the deaths recorded occurred over fifteen years of age.

The figures for ages of fifteen and over are shown in the second of the two tables. The final rates shown are obtained by taking the rate for the shoe-workers of the old borough, and the rate for those of the extended borough, and striking an average.

Having thus explained the principles on which the tables are constructed, the tables themselves remain for examination.

TABLE I.—NORTHAMPTON (Extended Borough.)

Total Population, 1901, 87,021. Over 15 years, 57,703.
Old Borough, 61,162.
Shoe Workers, 1901 (Extended Borough), 16,211. Over 15 years, 15,064.
„ „ (Old Borough) 12,355. „ „ 11,480.

	Whole Population over 15.		Shoe Workers.		Average Rate per 1,000 per Ann.	England and Wales, over 15, 1903, Rate per 1,000 per Ann.
	Deaths, 1901-1904.	Average Rate per 1,000 per Ann.	Deaths, 1897-1900.	Deaths, 1901-1904.		
Common Infectious Diseases......	51	0·16	3	3	0·05	
Diarrhœa	38	0·16	3	6	0·08	
Erysipelas and Septic Diseases...	27	0·12	1	3	0·03	
Phthisis	421	1·82	123	157	2·59	1·69
Other Tubercular Diseases.........	31	0·13	4	12	0·14	
Cancer	281	1·22	22	52	0·65	1·31
Bronchitis	298	1·29	48	48	0·92	1·00
Pneumonia	143	0·62	23	32	0·51	0·85
Cirrhosis of Liver and Alcoholism	48	0·21	3	5	0·07	
Heart Diseases	382	1·65	65	63	1·21	2·11
Kidney & Urinary System(1902–4)	59	0·34	13	25	0·34	
Apoplexy (1902–4)	145	0·84	32	38	0·65	
Diabetes (1902–4)....................	27	0·16	1	2	0·03	
Accident................................	52	0·22	7	4	0·10	
Suicide	49	0·21	10	11	0·20	0·16
	1903–4					
Senile Decay..........................	147	1·27	28	36	0·59	
All other causes	?	2·33	59	81	1·32	
Total	2943	12·75	445	578	9·48	9·77

The first point to strike one on examining this table is that the rate for shoe-workers over 15 and the rate for the whole country over 15 are practically identical, viz., 9·48 and 9·77. The rate for the whole country has been obtained by taking the total deaths for 1903 over 15, and calculating the rate on the population over 15 for 1901. There is a slight error introduced here, as identical years were not taken, but the figures for deaths in 1901 were not available to me at the time, and the

amount of error introduced is trifling. Next it will be observed (Table I.) that the rates given for the majority of the causes of death are small, and are evidently, therefore, such as might have been obtained for any class of workers in the country. These rates, therefore, need not be further considered. Phthisis, however, demands special consideration, and this I have given it in the second table. Cancer need not detain us, the rates for the town and the country generally are nearly the same; the fact that the rate is much less for shoe workers is owing to the fact that so many young women are employed as closers and machinists; these marry and cease to work at the shoe trade, while cancer is uncommon under 40. No doubt a proportion of them after marriage die of cancer, but their deaths would not be included among those of shoe workers. This accounts also for the difference between the total death-rate among shoe workers and that of the town generally, 9·48 and 12·75. Bronchitis appears to be much the same among shoe workers and in the country generally.

Pneumonia, both among shoe workers and in the town, appears to be less prevalent than in the country generally. The relatively low mortality from heart diseases among shoe workers appears to be due to the inclusion of young women as before mentioned, and the same applies to apoplexy, accidents, and senile decay. For these I have not calculated the rates in the country generally, as no purpose would be served by so doing.

TABLE II.

	Total Number over 15.		Deaths over 15.		Average Rate per 1,000 per Ann.	Phthisis.		
						Deaths.		Rate per 1,000 per Ann. over 15.
	Old Borough.	Extended Borough.	1897—1901.	1901—1904.		1897—1901.	1901—1904.	
Clickers	1,117	1,449	46	63	10·58	18	22	3·91
Closers	2,001	2,580	30	29	3·28	13	13	1·44
Machinists	1,229	1,598	15	20	3·09	4	10	1·19
Rough Stuff & Pressmen	444	576	14	21	8·50	5	4	2·27
Lasters	4,160	5,504	220	298	13·38	56	67	3·20
Finishers	2,068	2,739	90	109	10·41	23	37	3·08
Miscellaneous	461	618	32	36	15·98	4	4	1·89
Northampton	......	57,703 (1901)	...	2,943 (1903)	12·75	...	421	1·82
England & Wales, 1903	......	21.982,104	...	214,857	9·77	...	37,211	1·69

Turning to the second table, where the workers are divided into classes, the first point to attract attention when studying the death-rates from all causes is that the death-rates among the female workers are certainly low, while those of the males are above the average. This is at once accounted for by the marriage and disappearance from the fac-

tories of the female workers, the deaths which occur among them being due to causes affecting early adult and early middle life.

Next it will be noticed that the highest mortality obtains among the miscellaneous class. Considering, however, the comparatively small numbers of this class, I believe that this is an accidental result, and had figures for say ten times the numbers of this class been available it would not have shown any remarkable mortality.

The comparatively high mortality among lasters is probably due to the inclusion in this group of such classes as handsewn bootmakers, etc., which are chiefly represented by the older generation and are largely elderly men.

The question of phthisis, however, demands special attention. In the first table it will be noticed that while the mortality from this cause in the town generally does not greatly differ from that of the whole country, the disease is markedly prevalent among shoe workers. I have, therefore, given the figures for this disease and the rates for each class. Before studying them, I wish to observe that the phthisis rates are strictly comparable with each other, and that the fact of marriage among the female workers does not interfere with *this* comparison.

Phthisis is a disease of early adult life chiefly, though it occurs at all ages. Of the total number of deaths (280) among shoe workers during the eight years under consideration, no less than 170 occurred before the age of 35, and 214 before the age of 45.

Premising this, the first point to be brought out by the table is the great difference in the incidence of the disease in males and females. The phthisis rate among closers and machinists is less than half what it is among clickers, rough-stuff men, lasters, and finishers. The miscellaneous class shows an intermediate rate, and this appears to be explained by the fact that this is a mixed class, both men and women being employed.

Next among the male classes the most striking fact is the high mortality among clickers. Knowing the conditions in which finishers work, one would have thought that phthisis would have been most prevalent among them; yet, while the disease is very prevalent, in this respect they are surpassed by both lasters and clickers. It is difficult to draw any inference as regards such a mixed class of the table, but the clickers are a well-defined class, and the prevalence of phthisis among them is most remarkable. The general rate among males over 15 in the country generally is 2·08, so that the disease is specially rife among boot and shoe workers.

Dr. Tatham, in "Dangerous Trades" by Dr. T. Oliver, refers to this

when he says that pulmonary consumption plays sad havoc among shoe workers, their mortality from this disease being in excess of the average by 38 per cent. In comparing the influence of phthisis upon workers in various trades he mentions that the mortality figure among shoemakers is 256, compared with the agriculturists' 106.

The mortality-rate in Northampton was found to be 2·59 per 1,000, practically the same as the 256 mentioned by Dr. Tatham.

The following comparison can therefore be made:

Agriculturists	106.	Copper workers ...	294.
Blacksmiths	159.	Glass makers ...	295.
Iron and Steel manufacturers	195.	Printers	326.
Cotton manufacturers ...	202.	Potters	333.
Tin workers	217.	Cutters	382.
Shoemakers	256.	File makers	402.
Brass workers	279.		

With these may be compared finishers, 308; lasters, 320; clickers, 391.

A word of warning is, however, necessary, as regards clickers especially. The highest number dealt with, 1,449, is comparatively small, so that the result must be regarded as provisional, and one that awaits confirmation by a study of the results of a longer period, and of the figures obtained by other centres of the shoe industry. The figures 308, 320, and 391 are not comparable with those of the main list, as they cover somewhat different age periods. It is not legitimate either to compare the figures for sections of a trade with those for the whole of other trades.

Nevertheless, when all allowance has been made, there is a mortality which demands investigation, and it is from this meeting that I hope to get light on the subject.

I doubt that the prevalence of the disease can be laid at the door of the factories and workshops. Some of them I know ought to have a far higher standard of ventilation and cleanliness, but if the system, apart from the individual place, is to blame, I do not see how to account for the difference between the mortality among men and among women. It may be that a more accurate death certification would show that the disease among women had been caught in the factories though their names do not appear as shoe-workers in the death returns; but this I doubt, for our investigations into the cases of phthisis notified to the Health Office show much the same results as the death returns indicate. Two

factors, which it seems to me are worth consideration, depend upon the differences between the habits of men and women. Firstly, women as a rule do not spit freely, men often do, and that the disease spreads from the dried expectoration is well known. Hence possibly its prevalence in men's workplaces as compared with women's. Secondly, men frequent public-houses, women as a rule do not. Addiction to alcoholic stimulents undoubtedly predisposes to phthisis, and in addition a source of infection is easily found in the habits which make men in the lower class public-houses use the floor indiscriminately as a spittoon.

But while the figures are bad as regards phthisis, it is well to contemplate the brighter side of the picture furnished by the mortality from other causes; and I may conclude by another quotation from Dr. Tatham, which is in entire accordance with the figures I have given you. He says:—

> "Although the contrary is generally held to be the fact, shoemakers are shown, by the figures now at our disposal, to enjoy a degree of health which is at least equal to that of the average working man."

MR. WALTER BEALE (President of the Northampton Boot and Shoe Manufacturers' Association) dealt first with the clicking. This was a lepartment where more skill than exertion was required. The clicker did 1ot like draughts, and he often objected to windows being opened. Good ventilation without draught would be a great benefit. Owing to the lack of exertion, those in the department required to be kept warm. According to statistics, men working in this department suffered most from consumption. Some people had an idea that it was owing to the stooping position when at work at the bench; but it was acknowledged in Northampton that if there was a weak member in a family to be put to the staple trade, he was invariably placed in this departnent. As to closers, with machines going by power the exertion was about equivalent to the clicking department; a warm room and good ventilation were necessary. Great cleanliness should be observed, especially of the people themselves, as the people employed were mostly females. In the rough-stuff department there was a stronger class of men. They got more exertion in lifting leather and heavy knives, which they used at the presses. The men appeared to be better able to stand draughts by having windows opened, and all round seemed to be healthy. The lasting and heeling men were of the healthy class as a rule. Owing to the quantity of machinery used in this department and space required for the machines, it was as a rule a larger room and the men got more air-space. It had been noted that

it was bad for the men to put grindery in their mouths. Mr. Beale pointed out that automatic hand and machine tackers were used in place of men putting tacks in by hand and in one of the processes, the soles were put on with solution. It was also mentioned that men took tacks out from one tin and placed them in their mouths, and what they did not use they replaced in the tin. This was not so, because in small factories, where they had not so much machinery, a single man had his own tin of grindery, which he kept entirely to himself. This room required no warming, as they got plenty of heat from the machines. The department used to suffer very much from uncleanliness in the old days of piece-work; but since machinery had been introduced and day-work observed, workmen had very much improved in their habits. An inspection of the w.c.'s by the factory inspector at times would be beneficial to the department; there was plenty of ventilation as a rule. The finishing process used to be done by the men sitting down in a stooping position with the boot between their knees; but since machinery had been introduced they all stood up, which did away with that crouching and unhealthy position. The machinery did most of the work, and the men stood fairly upright at the operations. The only detriment to this department appeared to be the carrying away of the dust, and that was entirely in the hands of the operator. The fans should be in good working order and the pipes should be well fixed; if they should become clogged or disjointed in any way and the operator not be able to remedy the matter, he should at once report it to his foreman. Gas was used in this department, or what was usually called "blue light," but only about a fourth of what was used ten years ago; and there was not the exertion required that there used to be in the old times, owing to the introduction of machinery, which did the heavy work. The gas, together with the machinery, kept this department warm; the men stood (windows being open) and appeared fairly healthy. The shoe-room was the cleaning up department, and required to be kept warm. As a rule, it was the cleanest department in the factory. There were fewer people engaged, and therefore they had plenty of air and ventilation. Men and girls were employed, and were fairly healthy as a rule. Mr. Beale suggested that all w.c.'s should be well washed down every week and disinfected. It was also a good idea to sprinkle the factory with a fluid disinfectant at night. He was pleased to find the lady inspectors were visiting the workmen's homes, and he thought this work should be carried on efficiently, as it was necessary that homes should be clean and children kept clean. By doing so cleanliness would be observed among the working classes, and they would then object to work in dirty factories.

Mr. John Hill (Secretary of the Northants Branch of the Working Men's Club and Institute Union) attributed the prevalence of consumption among clickers to the fact that they were continually bending over their work in such a way as to prevent them breathing freely or naturally, and to the variations in

the temperature of the work-rooms. A considerable improvement had been effected in the lasting and finishing departments, but in many factories there was still a necessity to put grindery in the mouth, and with that a considerable amount of dust and dirt. There was not so much pressure on the chest and stomach as formerly, but against that there were the fumes caused by the heat necessary to run the machines, which undoubtedly have a very injurious effect on the operator, as also has the accumulation of dust arising from several of the processes, particularly in the finishing department. The temperature in this department was much too high, especially in the summer, due, he thought, to the almost total absence of ventilation; this was due in some measure to the workmen themselves, who seemed to think a vitiated atmosphere was better than a draught. He had never been in a factory where there was any complete or scientific system of ventilation or heating arrangements, and the effect on the health of the worker was very bad, especially on the boys, who frequently showed signs of loss of strength and vitality after the first few months' work. He referred with pleasure to the decreased use of alcoholic drinks in the factory, as the men seemed to do quite as much work without it. He advocated a longer dinner-time, which should be at least one and a half hours, during which time all the windows should be opened so that the atmosphere of the factory would be fresh and invigorating when the workers returned to business.

DR. C. KILLICK MILLARD (Leicester) said the subject under discussion was one which was of vital importance to the town of Leicester, which, like Northampton, was closely identified with the boot and shoe industry. At the last census the returns showed that of males over ten no less than 17,770 were engaged in this industry, which works out at 23·3 per cent. of the total male population over ten. There were also employed 8,791 females over ten, which is equivalent to 9·8 per cent. of the total female population over ten. Distinguishing between married and unmarried females, it was found that 6·1 per cent. of married women and 13·9 per cent. of single women in Leicester were engaged in this industry. As regards the health of the general population of Leicester, this for a large manufacturing town was distinctly good. The average death-rate (uncorrected for age and sex) for the last ten years was only 16·4, and even after correcting for age and sex it was only a trifle higher. Last year there were only two of the thirty-three largest towns which had a lower rate than Leicester. The death-rate for zymotic disease (other than diarrhœa) also compared favourably with other towns. Practically the only disease in which Leicester did not compare favourably with other towns was phthisis. The phthisis mortality rate, per 1,000 population, had averaged 1·69 during the last ten years. One was naturally led to ask whether the predominant industry, the boot and shoe trade, had any predisposing effect towards this disease. In the interesting paper which had been read by Mr. C. F. Wright the various processes of this trade had been described, and the dusty nature of the process of

"finishing" had been referred to. In all modern factories special arrangements were provided with each finishing machine for removing by extraction the dust as it was formed. In this way the evil was greatly lessened, but a certain amount of dust must escape and get into the atmosphere, as was witnessed by the dust to be seen on the men's clothing. According to Dr. Beatty's statistics, finishers did not come out so badly as clickers. This was contrary to what one would have expected from the nature of their work. It might partly be accounted for perhaps, as had been suggested, by the more delicate lads in a family being selected for "clicking," which was regarded as lighter work than "finishing" or "lasting." As regards ventilation in factories, he agreed with Mr. Wright that this depended largely upon the inclination of the employees. Most of the factories in Leicester were of modern construction, and provided with more or less satisfactory means of ventilation, but in many cases were not made sufficient use of owing either to indifference or to objection on the part of some of the employees. Of course, boot and shoe operatives were not exceptional in this respect. Workpeople everywhere, and indeed all classes, were much too indifferent to the vital importance of pure air. In the hope of doing some good in this direction, the Leicester Sanitary Committee were now issuing to all the factories and workshops in the borough, where the employers were willing, a large printed notice, mounted on stout cards to hang up, calling attention to the importance of fresh air in the prevention of consumption, and urging employees to insist upon having windows and ventilators open. These notices seemed to be appreciated. The Committee have also, during the past two years, been doing something in the way of providing sanatorium treatment for consumption by setting aside one block (containing eighteen beds) at their Isolation Hospital, for this disease. The object aimed at was chiefly educational, and the patients were therefore only retained a short time, one to two months.

ALDERMAN E. L. POULTON (Secretary of the Northampton No. 1 Branch of the Boot and Shoe Operatives' Union) wished to deal particularly with the ventilation and the cubic air space of the factory. Up to the present time architects had not devoted sufficient attention to what the factory was for, apart from the production of boots and shoes. He did not know of any factory that was ventilated as it ought to be, and he thought that nothing above 12 ft. from the floor should be calculated in measuring up air space. He trusted legislation would be enacted empowering the authorities to see that due attention was given to the inlet as well as the outlet of air. He knew from experience that many men preferred to work in an atmosphere very much heated rather than have an open window over their heads, which caused colds, he pointed out that comparatively few married women were now engaged in the factories, and he hoped the time would come when they would refuse to have them in the

factories, for he held that the proper place for the married woman was her home. He insisted that there should be a standard of height in dealing with cubical capacity, and hoped that they would continue to insist on factories being kept cleaner. He differed from Mr. Beale with regard to the Factory Act restriction. He hoped the Department would make it more and more stringent and abolish overtime, which had been abolished in some highly-organised trades. He trusted that they would go on working to secure the total abolition of overtime. Ten hours in a factory was enough for any man. The disadvantage of putting grindery in the mouth largely depended on the personal cleanliness of the worker, but he trusted before long there would be no necessity at all to put grindery into the mouth. Great care ought to be taken in seeing that the appliances for removing dust, etc., from machines were in perfect order. He believed that they were gradually getting to understand how to properly ventilate their factories, and to understand also that the health of the poorest individual was of very great importance to the community; and he trusted the result of that meeting would be that they would take more stringent measures against any who wilfully transgressed the laws of health. It was to the interest of the workman to insist on his fellow-workmen observing the laws of health just as much as the employer.

MR. FRANK WHITE (Northampton) said that it was gratifying to learn from the statistics on the mortality of those engaged in the boot and shoe industry that the worker was not prone to a specific form of disease (apart from phthisis), as was the case in the white-lead, pottery, and file-cutting industry, which in these trades was known as "plumbism." The effect of any trade on the worker was of national importance, and could not be too freely discussed, because it affected the health and prosperity of a vast community of bread winners, who were compelled to spend the greater part of their day in workshops, many of which might be termed "human beehives." Being of national importance, we naturally looked to factory and workshop legislation, and asked, do these measures fully safeguard the health of the worker in the shoe trade, as far as practicable, by reducing to a minimum those evils which predispose to disease? He thought emphatically, No! He considered that every opportunity should be seized to criticize the imperfections, omissions, and partiality which were too obvious in the Factory and Workshop Act; agitation might be the means of bringing about wiser legislation in the near future to remove those influences which were conducive to slow deterioration of the human body and open the door to consumption; he referred to the inhaling of vititated air, excessive temperature, and personal contact with pthisical fellow workers. To expose the fallacy of the Act, he referred to section 157, which exempts men's workshops from the fundamental principles of the Act. If it meant anything it meant that neither ventilation, temperature, nor drainage of floors could be enforced in men's workshops under this Act. Surely

the health of the male worker was quite as important to safeguard as that of the female or young person; the statistics given by Dr. Beatty proved that it was even more so. He had not time to point out the imperfections of the Factory and Workshop Act, but he did not hesitate to say that the administration of the Act, so far as it concerned the health of the worker in both factory and workshop, should be absolutely under the control of the local authority. Surely the medical officer of health was the most suitable officer to say what influences may affect the health of the worker. Until the law controlling factories and workshops was made better, he was inclined to think that all the meetings of The Royal Sanitary Institute for the purpose of discussing the effect of the work on the health of the worker would be futile.

MISS HILDA JOSEPH (Health Visitor, London Jewish Board of Guardians) said that she was endeavouring to formulate a scheme for the employment of consumptives whose disease had been arrested by treatment at sanatoria. She hoped that a colony would be started for these patients and their families, a sort of Garden City. As it was found in practice that the large majority of these patients could not be put on the land, she proposed that many of them be employed at their own trades, but these trades should be so carried out that the patients would be enabled to maintain their health. She wished to ascertain if the boot trade could be made suitable for her purpose. She realised the difficulties, but, given the following conditions, did the meeting think that it could be attempted? (1) The factory would be perfectly ventilated, there would be large windows on both sides of the room, and with the strict supervision which would be maintained, and the previous education which the patients would have had in sanatoria, these would be kept open. (2) The rooms would be thoroughly cleaned each day. Expectorations on the floor would be prevented. (3) The most approved machinery would be provided, and the apparatus for the removal of dust would be the best that could be obtained, and would be kept in efficient working order. (4) The workers would have a long rest at midday, the hours would be shorter, and each patient would be required to take a certain amount of exercise. The colony would be under the supervision of a medical man, who would prescribe the amount and kind of exercise, which would especially be adapted to counteract the bad positions maintained during work hours. Given all these conditions Miss Joseph asked those who were so well able to judge of the matter, whether the boot trade might not be available for consumptives whose disease had been arrested.

DR. ROBERTSON (Birmingham) said what was wanted was some better means of ventilation for the factories. If a better method were introduced, he believed the mortality from phthisis would be much reduced. Under present circumstances he thought an open window often did more harm than a shut one.

MR. FRANK MOBBS (Kettering) said the discussion seemed to be on the points only of ventilation and fresh air, and the remarks made and criticisms passed would hold good for almost all manufactories. He was pleased to know that the representatives of labour who had spoken had not blamed the manufacturers for this want of ventilation and fresh air, and believed that the remedy in a very large measure lay with the workers themselves, the death-rate in the statistics given showing that it was not an unhealthy trade, but compared favourably with the death-rate of the whole country. There never was a time when the health and comfort of the workers were studied so much as at the present, and what power was lacking by the factory inspector and his assistants to get the factories put into a sanitary condition could be obtained under the Public Health Acts. Local authorities had by periodical visits of their inspectors (both male and female) done a great deal to remedy many sanitary defects in both factories and workshops, and so safeguard the health of the operatives.

THE CHAIRMAN (Col. J. Lane Notter, R.A.M.C.), in closing the discussion, said ventilation was a difficult subject, and had never been taken sufficiently into consideration in the building of factories. Ventilation should be distinct from the lighting of factories; windows are intended for light and should only be used to assist any system of ventilation. In answer to Miss Josephs, under proper conditions he did not think the boot trade was worse for consumptives than any other trade. About six weeks in a consumptive sanatorium would be distinctly advantageous, to teach consumptive patients the proper steps to take in their own homes; the value of the work of lady inspectors could hardly be over-estimated.

A NOTE ON THE RECENT LITERATURE ON PLAGUE.

By COL. J. LANE NOTTER, M.A., M.D., R.A.M.C.
(FELLOW.)

WE are indebted to Dr. Charles Creighton for a most valuable contribution to the etiology of plague in India, in a paper read by him before the Society of Arts last summer.

The relationship that exists between certain conditions of soil and the occurrence of epidemic disease in tropical and sub-tropical countries has been the subject of study by many epidemiologists.

That such relationship exists is now almost universally admitted, and it may be laid down as a rule that the epidemic occurrence of disease in any one place implies, besides the importation of the contagion, certain local conditions, these being :—

(*a*) General sanitary defects.
(*b*) Peculiarities of climate.
(*c*) Peculiarities of soil.

The history of epidemics in India teaches us that universally filthy surroundings accompany outbreaks of epidemic disease, and it can be readily understood why it is next to impossible to control an outbreak when such favourable conditions exist for the development of an outbreak after the importation of the seeds of the disease.

As regards climate, there can be no doubt that a relatively high temperature favours the production of epidemic disease. Warmth and, up to a certain degree, moisture are the physical conditions above all others that foster the development of the specific poison.

The peculiarities of soil which favour the spread of epidemics are not by any means the least important factor. We find in all the records of epidemics a remarkable fact has been noted, that they have always attained their widest diffusion and their greatest intensity in those localities which are distinguished by a certain physical soil character, namely, permeability to water and air, and on those kinds of rocks which have a large capacity for retaining the moisture which has fallen on them.

A careful study of the literature of epidemics in tropical countries indicates that in considering the incidence of disease upon any peculiar soil, it is not the geological character of the soil itself, but the saturation dependent thereon in which the true explanation of this phenomenon is largely to be sought; but even this does not cover the whole case, for it again is affected by soil-heat, rainfall, subsoil water-level, soil-air, and general climatic influences, to say nothing of the nature and quantity of the organic matter in the soil.

Dr. Creighton tells us that the regions of India which have been proved by an experience of nine years to be the great seats of plague are somewhat compact and continuous in two divisions: one the plains of the North-west, the other the alluvial valleys of the Deccan and Gujurat; but that there have been many deaths in other parts of India. As plague is not found to be contagious from person to person, except in its pneumonic form, everyone sees that the interest must centre in the infection outside the body. Dr. Creighton does not favour the idea that the rat is the source from which the disease is communicated to human beings, or that fleas found on rats may introduce the infection. He states that the theory of inoculation through wounds of the feet is also inapplicable.

Dr. Creighton gives us a very detailed and interesting history of his investigations. He discusses the incidence of place during the course of the epidemic, and gives as examples, villages such as those in Satara, all made up of mud houses, enclosed within a ring fence of bushes, sometimes with gates and the remains of a wall. Some of these villages lost more than one fourth of their inhabitants in two or three months. On the other hand, the villages of Ratnagiri are built of stone. Such villages are hidden in the foldings of the hills, and are placed usually along a stream; there is an extensive ghât of dressed stone usually leading down to a pool of the river. Facing the ghât is the village bazaar, the roadway is paved with stone; the houses of one, two, or three storeys, with stone walls and tiled roofs, are raised some four or five feet above the road on plinths of dressed stone, and sometimes with stone steps below the plinths. Plague has been introduced from the numerous small harbours along the coast, but it has never taken hold of these villages.

These two districts are as nearly comparable as possible, having the same number of village communities, both adjoining and both being agricultural districts. The annual average number of deaths, from first to last, has been in the Ratnagiri district only 400, while that of the Satara for the last four years has been nearly 30,000.

In further discussing this subject, Dr. Creighton points out that the

majority of native dwellings in the North-West and Punjab, are constructed of mud walls and roofs, as these are believed to withstand the extreme heat and cold better than other structures, but the more general explanation is the ease and small cost with which mud houses can be put up. With regard to the evacuation of infected houses, he states that the intuitive perceptions of the people correspond with the scientific theory of a soil poison. They know that the chief risk of taking plague is from spending a night in an infected place, and generally that they incur the greatest risk when confined most to the dwelling houses, by cold, domestic duties, or other cause. One important factor Dr. Creighton states he has to pass over for want of time, namely, the injurious effect of a high level of the ground water, and its seasonal fluctuations in its filth-sodden soil.

Dr. Creighton asks:—"Is there anything to be learned as to the probable duration of this disease from historical precedents, and from its own course during nine years?" At one time he was of opinion that a progressive change of a village site to a clean soil, along with the break up of larger villages into several hamlets, would be an effectual if a very slow means of getting rid of plague, but after seeing many of these dreadful mud villages, he has come to think that it is their miserable structure that is the real reason why the Indian plains are cursed with plague, and that there can be no real cure without a more civilised kind of dwelling, and a great revival of the native building arts as village industries.

In a very carefully drawn up report on a fourth outbreak of plague at Sydney in 1904, Dr. Ashburton Thompson adds some remarks on the etiology of the disease, based on its observed epidemiology in the four epidemics. He tells us that epidemic plague at Sydney has always depended wholly and solely on epizoötic plague; and it has been successfully controlled there by measures directed, not at man, nor at the filth in which he sometimes lives, but at the rat alone. The plague rat is the source of infection for man; to get rid of it is to stay the disease. Dr. Thompson argues the question with great force and authority and cites several instances in support of his views. The weight of evidence, reading this, and his previous reports, is decidedly in favour of the theory advanced by him, and that there is a causal connection between the epizoötic and the epidemic in man there can be little doubt. How the infection is conveyed from rat to man is a subject of great practical importance. The hypothosis of the flea apparently does not afford a complete answer to the question.

With regard to the association between the infection and localities in which it has been shown to exist, Dr. Thompson remarks, that its

possible niduses appear to be comprised under the three headings, air, water and soil. In air it could not continue and above all could not flourish any more than other infections of a like nature. By water it was not conveyed at Sydney, and it is now generally agreed that by water it cannot be conveyed. In the earth it might live, continue and, in some sense, flourish, and, without denying that it might find a place in the surface soil of cities, it must be admitted that there it would be exposed to a thousand inimical accidents. On the whole, he states, the observed phenomena indicate that the suggestion of association between the infection and the soil in relation to attack of man is impracticable. Plague is not communicated to the soil; the soil does not communicate it to man; association between a locality and the infection is a transcient condition. Further he states that the etiology of plague must be the same everywhere, epidemics must be due to similar causes wherever they occur.

The behaviour of the intermediary between rat and man, which latter, though still hypothetical, is also still indispensable, may give rise to slight variations; but these, when they come to be fully understood, will be found to have been apparent rather than real. The rat is the *fons et origo* of infection. In many other countries where plague exists, conditions of race and creed, customs and civilisation, housing, morals and instruction, have rendered accurate and complete epidemiological observation impossible. In the present and previous reports the records are as accurate and as complete as the nature of such enquiries renders possible. A careful perusal of these reports leaves no doubt on the mind of the writer of this fact. Dr. Ashburton Thompson must be congratulated on the very careful series of investigations which he has made, and the conclusions which he has drawn from them. In the present state of our knowledge it is difficult to assign to one cause the *rôle* played by epidemics under variable conditions of climate, etc., but the fact of the transmissibility of diseases from animals to man is now being recognised as a most important factor in the causation of epidemics, and careful study should elucidate many points and give the clue to such preventive measures as will control the spread of epidemic disease whenever and in whatever country it appears.

SCHOOL HYGIENE.

By J. S. C. ELKINGTON, M.D., D.P.H., J.P.
Chief Health Officer for Tasmania.

THE enactment of compulsory education by the various Australian States, in common with other civilised peoples, has carried with it certain far-reaching consequences of profound importance to the race, and it is only within the past few years that these consequences have come to be recognised in their true light. In the time at my disposal, however, it is impossible to attempt to discuss anything more than elementary principles and to incidentally allude to their application.

In adopting compulsory education the State practically reduces education to a State monopoly. Private schools are recognised co-equally, however, with State schools as qualifying children for conformance with the requirements of the Acts, and school hygiene cannot be regarded as State school hygiene alone. The State responsibilities cover all classes of schools, however, and the State directly undertakes the care of the vast majority of all school children. Hence it behoves the State to lead the way in any system of educational reform, and particularly in that aspect which is now under discussion. Education is a biological process whereby certain discrete growing organisms are in process of being fitted to their environment in order to render them more useful to that concrete organism, the State. The environment has a physical as well as a spiritual side, and nine-tenths of those children who undergo the process of fitting will depend for their success and happiness in life almost wholly upon the physical side—in other words, upon the integrity of their bodies, and not upon the degree of culture of their minds. Some two-thirds of them, moreover, will be the parents of the next generation, and in the nature of things the stamina and *aequanimitas* (to use that portmanteau word in which Professor Osler sums up, as Pius Antoninus did before him, so much of import to the race and to the individual) of that generation will largely depend upon the bodies of the children now in our schools.

The greatest of the faults committed in the name of education in the

From a paper read before the Interstate Medical Congress of Australasia.

past has been the non-recognition of this physical side, either as an all-controlling factor in the development of the spiritual side, or as an all-important influence on the child's future. It is impossible to deny that this oversight has resulted in an incalculable waste of public and private money, and in a monstrous injustice done to thousands of Australian children. These are strong words, and I utter them with a due sense of their seriousness.

School is not merely a preparation for life, but an important part of life itself, wherein body and mind are alike plastic and capable of almost infinite development for good or ill. In the German Imperial Health Manual a great truth is summed up in a pithy sentence: "The sense of justice demands that in a State where attendance at school is compulsory, the children shall be exposed as little as possible to dangers of health while in school." Far reaching as is this principle, I submit, however, that a sense of justice demands more than this. It requires the practical recognition of the fact that not only shall children be protected from the many physical risks induced by the entirely artificial process to which compulsory education submits them, but that they shall be practically and intelligently instructed in the few simple rules by which they may carry the process of protection on to their after life. It requires further that justice shall be done to the taxpayer in that the immense amount of money which he contributes for the purpose of compulsory education shall be expended to the best purpose, in that by sensible instruction and care at school there shall be saved a proportion of the further sum which he contributes for the treatment of unnecessary preventible disease, and in that large sums will not continue to be wasted in attempting to force symbolic information through eyes that cannot see correctly, and ears that cannot hear properly, in order to reach brains somnolent and unresponsive through poisoning by vitiated atmosphere.

It is scarcely necessary to point out that the school hygienist is no longer to be regarded as a crier of trifles in a wilderness of fads. His arguments and aims are based upon the common sense of every day professional practice and upon the elementary laws of physiological knowledge. The educationist and hygienist must work hand in hand, and nobody recognises this more fully than the educationist. Professor Nicholas Murray Butler has stated the question from an authoritative educational standpoint: "The most grievous single obstacle in the way of the spread of sound educational principles is the popular view that the essentials of education are limited to instruction in reading, writing, and arithmetic. It might fairly be argued, and with no small

force, that the possession of so much knowledge alone is a positive detriment to a human being, especially if that knowledge has been gained at the expense of physical and moral habits, which in educational value far outweigh any such meagre intellectual attainment. . . . . It is not too much to say that health, its provision and protection, is all-controlling in present-day educational theory, although it is unfortunately far from being so in practice. The chief reason for this discrepancy between the ideal and the real is simple ignorance. Teachers and parents do not recognise that eyesight is being impaired, normal growth prevented, blood poisoned, and the body starved, because the hours of school life are so often unhealthy and abnormal hours . . . School buildings are constantly erected with a view to external effect alone, and an adequate system of ventilation and a proper site are pronounced too costly . . . . It is not true that a child is always and everywhere better off than running at large in any village or city. If the class-room is already overcrowded, if there are already too many pupils assigned to a teacher, then every additional pupil who is brought in injures those who are already there, and receives injury himself."

These weighty words were uttered from a Chair of Education. Could we as reasonable beings expect plainer speaking, or more destructive criticism of the three R's-at-any-price system, from the most iconoclastic professor of hygiene who ever laid sacrilegious hands upon a domestic or a national muck heap?

The work of the educationist and of the hygienist are, then, complementary. The neglect of hygienic requirements in school life not only injures the most valuable assets possessed by the State, but it absolutely debars the most skilful and accomplished educationist from obtaining the best mental reaction, and hence wastes time and money. In turn, the educationist must awaken the sanitary conscience early in life before any real or lasting advancement can be made in national hygiene. I am not of those enthusiasts who predict that the schoolmaster will be the sanitarian of the future. The schoolmaster will never replace the sanitary administrator, but it is only through his—and particularly her—work and occupation that we can hope to attain to that national physical morality wherein preventible disease shall appear in its true light as somebody's crime, and the preservation and protection of health shall be accepted as a sacred duty.

This implies no ardent forecast of a sanitary millenium in which all minds shall go attired in the chaste drab garb of hygienic seriousness, and the young man's fancy before turning lightly to thoughts of love will

impel him to look up the family history of the beloved for traces of tuberculous or alcoholic tendencies. It does, however, imply a hope that from due recognition by the State of the vast economic importance of school hygiene and of properly directed hygienic instruction, there will accrue, amongst other important results, a notable increase in the national common sense, an intelligent appreciation of scientific medicine as distinguished from quackery, and a notable decrease in preventible disease in all its protean shapes and all its far-reaching consequences.

The life of civilized mankind grows more and more artificial every year, and the standard for even moderate success rises higher and higher as man's busy brain overcomes the impossible of to-day, and fits it into the daily round of to-morrow's work. The need for a sound, well-cared for body remains as great as in the days when the primal savage wrested a living from uncompromising nature. Children must, then, be taught to live. They must be protected against the early consequences of that civilization which afterwards demands so high a standard of fitness, and which treads down so remorselessly the unfit. The most daring cannot reconcile the cruel demands of racial fitness for the physical extinction of the weak, with the humanitarianism which inspires modern hygienic practice. We must not—cannot—obliterate the unfit; we cannot simplify the ever-increasing demands of civilization, hence we must strive by all possible means to prevent the originally fit from being rendered unfit, and to eliminate as far as possible the conditions which tend to accentuate existing unfitness.

It is a common sense business proposition, after all, as the fitter the population can be rendered in our schools the better value do we get for our money.

Conversely, every child who leaves school damaged in health by defective school conditions, every child who passes through school life hampered by practically removable causes, which have prevented him from getting twenty shillings' worth of useful knowledge for each pound of taxes or fees spent upon him, and every child whose time has been wholly spent in being fitted to a comparatively useless spiritual side of an environment which is almost wholly physical, represents an unwarrantable waste of money, energy, and time, practically amounting to criminal negligence.

Destructive criticism is proverbially easy, and I need scarcely say that school hygiene does not confine itself to pointing out defects. Practical and readily attainable measures for their removal or mitigation are essential. The object of school hygiene in all its bearings is to increase and enhance educational result, and it must be severely subordinated to

this object by the study of pedagogic requirements, and by due appreciation of the numerous difficulties, structural, administrative, and financial, which stand in the way of a perfect system.

All hygienic defects may be classed under two main headings: (1) Defects of structure and apparatus, and (2) Defects of management. Each is complementary to the other. A defectively constructed school may hamper excellent management, and on the other hand ignorant or careless management may render nugatory the advantages of a well-planned and well-fitted building.

In practice, however, defects of management are for several reasons more important than are defects of structure. A skilful teacher versed in elementary hygienic principles and practice can overcome and mitigate much structural wrong-doing, and no proposal to pull down and re-erect on proper lines every structurally defective school building, or part of a school building, can come within the scope of practical politics, however sapiently we may argue from the standpoint of national economy. Further, as has been already indicated, we have to depend largely upon the teacher for the intelligent and effective employment of any improvements which may be introduced into future schools.

For my present purpose, State schools and State educational administration only will be considered, as affording at once the widest field and the most useful example, although it is necessary to avoid the fallacy of believing that private schools are free from defects or require less attention. In my experience, defective as State school buildings have often been found to be, they are, *quâ* hygienic structure and management, far superior as a class to private schools.

The training of teachers and inspectors in school hygiene hence assumes the place of first importance, and it cannot, I think, be argued that the compulsory inclusion in the teacher's curriculum of such training would impose an unnecessary or unbearable burden upon these usually much-trained individuals. Certain pertinent arguments may be here suggested, as showing that the question is one of vital interest to the teachers themselves. Where a superannuation fund exists, as in South Australia and Tasmania, wholly supported by State teachers, it is to the indubitable financial advantage of this class of individuals to eliminate as far as possible all causes which tend to disable or kill contributors, and hence to draw upon the fund. No improvement is likely to cripple the fund by turning teachers into a race of centenarians. The teacher is susceptible to bad hygienic conditions in schools, not to such a marked

extent as are the children, perhaps, but nevertheless to a sufficient degree to produce serious damage to a body already weakened by any cause.

This effect of insanitary school conditions upon teachers forms by itself an important question in school hygiene, and one which should appeal strongly to the influential and numerous class which it affects. Further, under a system whereby a teacher's prospects in his profession are largely influenced by the educational results obtained by him as ascertained by inspection, it is obviously only fair that physical obstacles to mental reaction, such, for instance, as adenoid growths or myopia, should be assessed at their real value, and that the children who are thus defective should not be lumped in with their normal brethren. For this to be carried to its best conclusion, a system of medical inspection becomes necessary, but, failing this most desirable provision, a fair degree of practical and skilful training of teachers and inspectors would enable the majority of cases of this kind to be at least suspected and allowed for.

I am aware that by such exemption or separate consideration some special provision for certain defectives would ultimately become necessary, as has been the case in London and elsewhere, in order to secure such degree of education as they are capable of receiving, and to prevent neglect. In addition to the identification and separate consideration of defectives of these classes, and the consequent removal of much misery and heartburning now undergone by certain unfortunate children who are punished for faults beyond their control, results obtained elsewhere show a distinct increase in mental reaction from measures of school hygiene. To quote a single instance, it was found by Carnelly that the installation of mechanical ventilation in three schools resulted in an increase of passes in reading from 95·6 to 99·6, in writing from 90·4 to 97·8, in arithmetic from 84·2 to 92·4, and in the grant earned from 19s. 6d. to £1 1s. 8d., as compared to fifteen schools ventilated by natural means only. I do not desire to use this as an argument for the universal introduction of mechanical ventilation, but as an instance of the beneficial influence of improved hygiene upon the prospects of a conscientious teacher working under a system of classification.

For these and other reasons the instruction of all teachers in school hygiene is likely to be of much benefit to themselves, as well as to their pupils. A further argument in its favour is to be found in the necessity for recognising those signs of fatigue, physical or mental, which are characterised by the late Inter-Departmental Committee on the Model Course of Physical Exercises (England) as forming to the experienced

teacher "the gauge on which he keeps his eye in regulating the work of a class." School stress is far more a matter of defective hygiene than of mental strain, and I view with extreme disbelief the attacks which are sometimes made on the State educational curriculum as being, *per se*, a frequent cause of breakdown in children. There may be more of it than is absolutely necessary from a utilitarian standpoint, but, given sound hygienic conditions, there is not enough in the most comprehensive curriculum of the Commonwealth to produce any worse effect than a little intellectual dyspepsia.

Two arguments are occasionally heard which may be here quoted. One is that physical culture will probably overcome any bad effects from school conditions. I need not attempt here to explain the absolute futility and unsoundness of such a statement, or to demonstrate the impossibility of attempting to overcome the effect of a couple of hours of somnolence in an atmosphere heavily charged with air-sewage by a few minutes of club-waving and toe-touching. I have no intention of decrying the excellent results which may be expected to accrue from a well-planned and carefully executed system of physical culture for schools, but it is, in my opinion, a dangerous procedure when carried out in the absence of a system of medical inspection whereby the weak lungs and weak hearts may be safeguarded.

The second of these objections is summed up in that single word "Expense," which almost invariably forms the earliest war-cry of the opponent to reform. I have already stated certain arguments which go to show that the maintenance of existing conditions is likely to result in the waste of much more money than would be required for the most drastic hygienic reformation of State schools. Setting this aside, however, I am prepared to state from actual experience that not only is it no more expensive to erect schools on moderately hygienic lines, but that it is actually cheaper. There is no need, therefore, to perpetuate in future schools the hygienic defects of many existing ones.

The addition of an extra subject to the teaching curriculum carries with it no gigantic financial responsibility, and may even be calculated to relieve the State finances to some degree in respect of sick-leave, compensation, &c., granted to teachers for temporary or permanent breakdown. It will further tend to limit the interference with educational work and consequent expense, now caused by certain preventible school diseases, and will enable better value to be got for the taxpayers' money. The inauguration of a system of medical inspection of schools will un-

doubtedly require the outlay of money, although not (to a very great extent) commensurately with the benefits to be expected.

The practical instruction of children in the elementary laws of health and of health protection, involves no material expenditure, and can be productive of nothing but good. Unfortunately, there has been in the past rather too much done in this way for the child as he should be, and all too little for that common object of the school-room—the child as he is. There has been too much book, and too little treatment of the subject in a live practical fashion calculated to render the knowledge of elementary hygiene as widespread as is the knowledge of reading. There has been too much of a tendency to inform the Australian twelve-year-old, that "Indulgence in alcohol is detrimental to the human organism," and too little instruction in the benefits to be derived from the proper use of a toothbrush, and the disgrace and danger of spitting, with regular practical demonstrations of the methods of ventilating and even of cleaning the schoolroom.

The formation of hygienic habits of breathing, and, above all, the strenuous enforcement of correct habits of working attitude from the day the child takes his place at his usually misfitting seat, have been neglected in the past. All such teaching must be intensely practical, and the habit-formation tendency of the youngest children must be fully utilised. Physiology is useless until the basic laws of healthy living have been learned from example and precept, and those pretty demonstrations with lamp-glasses and a cigar-box, or with limewater and a glass tube, as described in the books, should only be employed after a working school-sanitary-organisation has been formed amongst the children themselves, coincidently with the establishment of a rigid standard of personal cleanliness. It is not implied that any preponderating amount of the school day should be occupied with elementary hygiene, or that all other teaching should be subordinated to it. Its economic importance, however, warrants its inclusion as a frequent subject of instruction. As a pedagogic subject it needs no apology, in that it teaches the child to see, to reason, and to remember, it lends itself both to training and instruction, and it possesses high ethical value. In conjunction with its allies, domestic economy and civics, it practically conforms to that science of eugenics towards which the highest educational thinkers are striving as the coping-stone of modern education.

In the school buildings where education is carried on, the trail of the "practical builder"—that curse of school construction—is to be picked

up almost everywhere in the Commonwealth in the evidence of disregarded orientation, neglected lighting, defective ventilation, absence of perflatory facilities, expensive bell-towers, and fretted stone window borders, dust-trap interiors, and all the other evidences of his diseased love of architectural frippery. I trust I may be excused for saying that most of the larger and more ornate school buildings of the Commonwealth, other than those of quite recent date, display the methods of the slattern—all show and pomp without, all dark, foul, and difficult to cleanse within. The sole object of the school builder in the past appears to have been to devise a fabric as much as possible resembling a cross between a Chinese pagoda and a Gothic barn, and to set that building square with the nearest street or road, regardless of the sun's track or anything else, excepting a desire for apparent neatness and regularity. Having outlined his building, he appears to have proceeded to cut up its interior into various rooms, passages, assembly halls, and so on, according to its size, and to stick on, still with a pathological desire for neatness, such adjuncts as were required to make it resemble the last school of that type which he perpetrated. He then put in the windows at regular intervals all round, quite irrespective of size or of direction of entering light relatively to the seating lines, pepper-boxed a few fireplaces and things about in convenient places, added a belfry, and made a few holes in the ceiling (if there were a ceiling) for "ventilation." If he remembered inlet-ventilation, he specified something like "Tobin's tubes, not exceeding five shillings each." This may perhaps appear to be a flippant and even malicious description of the methods pursued, but if I am dealing unjustly with the school designer of former days, he has managed to completely conceal all evidence in his own favour.

For obvious reasons the inside of a school requires far more attention than does the outside, and all unnecessary and expensive architectural vanities should be ruthlessly swept away. In the case of many large schools, the money which has been wasted on bell-towers, carved stone porches, and other meretricious adornments of no practical use, would have enabled the interior to be fitted with modern hygienic facilities. There is no need to aim at the severe simplicity of a gaol, but rather within reasonable limits to adopt the utilitarian but yet æsthetic principles of modern hospital construction.

The hygienic training of teachers requires to be carried out on practical—even clinical—lines. Reading is, of course, necessary, but in any set course of this nature practical and clinical demonstrations plentifully illustrated by lantern slides taken in the locality, and not imported

rom other places where conditions differ, should form a large part of the raining. Women teachers should be practically instructed in the care of nfants, and in the principles of clothing, washing, and feeding them. The true position of artificial feeding as a last resort, and *not* as an dmissable alternative to breast feeding, should be insisted upon. Domesic economy and civics should be freely interwoven with any such teaching, nd the whole made to form a living subject, and not a mere collection of ook aphorisms and half-digested formulæ.

Comparatively little physiology is necessary, and what is employed hould be carefully subordinated to its practical application. The use of Snellen's types, together with their range of application in lay hands, the nethods of conducting head-and-hand drills, of detecting adenoids, eye lefects, and other physical obstructions to mental reaction, should form a part of the training, freely illustrated by clinical examples and slides. Practical elementary hygiene, including methods of dealing with house efuse, of ventilating, warming, and lighting, and particularly methods of nanaging and improvising facilities of this character, should be explained nd demonstrated. The signs of fatigue, and the conclusions to be drawn rom such signs, together with measures for remedying the same, and the principles of correct working attitude, are further subjects which may vell receive attention.

These form but a part of any full course of hygienic training, but, for eachers possessing live knowledge of this character, the systematic obserration of pupils for physical unfitness, hygienic school management, and the organization of practical instruction in the ways of healthy living, hould present little difficulty. A definite hygienic purpose can be made o enter into and influence every day of the child's school life. In the nfant classes, habits of correct working attitude and of proper breathing nay be fixed for ever by a skilful, patient teacher. The spitting habit hould be here vigorously attacked.

I trust that I may be excused for referring to a remarkable fact, tated at the 1905 Teachers' Conference in London, namely, that the vork of the kindergarten teacher and the nursery governess far outweighs n importance the most brilliant displays of professorial erudition. This ndividual dominates the whole educational system, and unless her work is kilfully and conscientiously performed, no subsequent teaching can emedy her errors. But, on the other hand, no subsequent mismanagenent can entirely negative the beneficial results of skilful infant teaching. It is the age of habit formation with which she deals, and her fingers nould the nation. No books, no "set talks," no detailed explanations are

of any use in her work. The child is strenuously learning life, and the results of that learning are expressed in fixed habit. He educates himself from anything that is available, and the infant teacher's business is to render available the right things in the right way, and to ensure that they are rightly used. It is the most skilful of all teaching, and the most momentous in its results.

In the middle school a little set instruction and much practical demonstration and application will carry on the teaching. The selection at monthly or fortnightly intervals of a sanitary officer for each class, and the deputing to that important functionary of direct responsibility for the ventilation, regular perflation, and general hygienic management of the room, would, in the hands of a judicious and skilful teacher, awaken much interest in such matters amongst the children. To this should be added practical demonstrations of cleansing methods, and of other principles of domestic hygiene, strict adherence to a high standard of personal cleanliness as checked by daily head-and-hand drills, and occasional talks on elementary principles. Books here require to be very simple, but artfully constructed withal, and absolutely free from any trace of that enemy of our youth, Mr. Barlow.

In the upper classes, the appointment of a sanitary officer should be continued, but such appointment should be made by ballot, as forming a peg on which to hang much useful information anent civic and municipal government and methods. Some reasoning may be expected from children in this division, and principles may be explained. Elementary physiology is useful here if employed for purposes of explanation and illustration. Instruction in elementary civics and domestic economy should be interwoven, and the physical side of the environment kept clearly in view. Communicable diseases, their results to the individual and to the community, and measures for their limitation and extinction, by domestic or civic isolation and disinfection, may be explained in some detail, together with the common-sense rationale of health-protection and preservation in the individual and in the community.

In the larger centres, regular demonstrations of proper methods of clothing and caring for infants may with advantage be given to the older girls by a trained nurse or other skilled person, artificial feeding being explained and illustrated, whilst emphasizing its true position as an undesirable alternative. By the exercise of a little tact it would generally be possible to borrow a live subject for purposes of demonstration. The attendance of mothers, and particularly of young mothers, should be encouraged.

In large schools a sanitary monitor of each sex should have the general supervision of all school sanitary matters outside the teaching rooms, reporting daily to the head teacher or principal female assistant respectively. These reports should, after investigation where necessary, be recorded for examination by the inspector. All this may perhaps sound rather formidable, but there is good reason to believe that it, and a good deal more, might—and I have no reason to doubt, eventually will—be made to form a part of the educational administration of at least one Australian State, without much risk of hygienic over-feeding. In this I am supported by the opinion of educationists of wide experience, and by the keen interest and appreciation with which Tasmanian teachers have welcomed my own efforts in this direction. Without going into the practical details of medical inspection, I may perhaps say that it will be only through the co-operation and intelligent assistance of teachers that such procedure can be organised or conducted on economic or effective lines. That this co-operation and assistance will be forthcoming I have good reason to believe, so far at least as my own State (Tasmania) is concerned.

All measures of medical inspection and of hygienic school management, all measures, in fact, of school hygiene, have for their object the enhancement of school efficiency. The leaders of medical and educational thought in the older world recognise this, and I am of opinion that the time has come when educationists and medical men in Australia should work manfully together for the physical and mental advancement of our race. Such co-operation is not confined to professional hygienists and to educational administrators; every practising medical man and every teacher has a definite interest in the question, and can afford useful assistance in the cause of common-sense hygienic education and of common-sense school-management.

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GENERAL NOTES.

INTERNATIONAL CONGRESS ON TUBERCULOSIS.

Paris, October, 1905.

The first sittings of the Congress took place on Tuesday in the Grand Palais.

At the opening meeting the President of the Congress, Dr. Héraud, alluded, in the course of his remarks, to the place which France had taken in the combat against tuberculosis. Before even Germany had mustered herself together in this fight, Dr. Brouardel organised a means of attack against the dire disease.

Following him, General Stabsarzt Schjerning spoke for the German Empire. He touched on the work which each country had done, and then dealt briefly with that done in Germany since the London Congress. Behring was first mentioned, and Kossel and Weber also received a few words of recognition. The increase in the number of sanatoriums had, he said, gone on apace, and other institutions which assist in the attempt to limit the ravages of and cure the disease were springing up on all sides; 127 such establishments, representing the sum of 54 million marks, existed in Germany to-day.

Dr. Theodore Williams followed in the name of England. He referred to the part France had played in the investigation of tuberculosis, and mentioned the names of Bayle, Andral, and Laënnec, Louis, Trousseau, Villemin, and many others. Turning to the work in England, he said that His Majesty King Edward VII. had set an excellent example. It was sixty years since Great Britain began to erect special hospitals for consumption. The action of certain local authorities too had done much in the right direction, and the Government departments also had taken up a part of the work. He illustrated this by quoting the Royal Commission, which investigated the relation of human and bovine tuberculosis, and the gratuitous bacteriological examination of the sputum by local authorities.

Professor von Schrötter spoke for Austria. He stated that a great advance in the direction of social hygiene had followed upon the last Tuberculosis Congress.

Following the delegates' speeches, Professor M. Letulle, General Secretary, gave a description of the organisation and work of the Congress. He stated that over 5,000 had joined, including 3,500 members and 1,500 exhibitors. The Committee had chosen twenty important questions to be dealt with, and forty papers had already been printed for the discussion of these questions. The programme contained 800 other papers.

At the Exhibition there was a very careful arrangement of excellent specimens, prepared by some of the most accomplished pathologists and bacteriologists of the day.

A few cases of lantern photo-micrographs exhibited histological and bacteriological methods. Dr. Bushnell and others exhibited some tubercle bacilli specimens under the microscope. The majority of the specimens were excellently prepared and mounted, but did not show any lesion with which one is unfamiliar. One exception to this was found in the specimens shown by the Veterinary School and by Dr. Rabinowitsch.

The part of the Exhibition devoted to the description of sanatoria was also excellently carried out.

There were fascinating models of the grounds of various sanatoria, models of sputum, disinfecting rooms, and models of the internal arrangements.

In the Section of Medical Pathology, the subject for discussion chosen was the relations of the bacillus tuberculosis and the other acid-fast bacilli. Nothing strikingly new was spoken of, but the generally accepted view may be stated to be that morphologically the various tubercle bacilli and pseudo-tubercle bacilli are identical; culturally there are slight differences, which, however, are not reliable, but, as far as their virulence is concerned, there are marked differences.

PROFESSOR VON BEHRING spoke of what he termed the "philogenetic" differences, and referred in general terms to the importance of this in following up the subject of immunization.

DR. LYDIA RABINOWITSCH gave a very able paper on her recent work on acid-fast bacilli.

PROFESSOR MARAGLIANO again described his work with dead bacilli.

PROFESSOR VON BEHRING said that during the last two years he had come to the recognition of an entirely new (curative) principle, which differed completely from the antitoxic principles which he had described fifteen years before. This curative principle plays a part in the immunizing action of his bovo-vaccine, which has proved of practical value against bovine tuberculosis during four years. The principle depends on the impregnation of living cells by a substance derived from the virus of tuberculosis which he calls TC. When TC forms an integral part of the cells it becomes metamorphosed, and he calls the product TX. TC possesses extraordinary qualities, having a "formative" and a "fermentative" function, while it assumes a selective absorption, and also has, under certain conditions, assimilative qualities. TC is the cause of the hypersensibility towards Koch's tuberculin and of the protective reaction against tuberculosis. He would never have had the idea of this cellular immunity, as opposed to the "humoral" immunity of the antitoxins, if he had not closely studied the work of Metchnikoff on phagocytosis.

He presumed that the audience was familiar with his method of immunizing cows. He had considered the possibilities of applying this procedure to human beings, but had come definitely to the conclusion that one must avoid using living tubercle bacilli in the case of man. He arrived at the results by means of experiments *in vitro*, after long and painstaking research. He succeeded in transforming the "active" immunization into a passive one. Putting the matter briefly, in order to liberate TC it is necessary to distinguish three substances produced by the bacilli. The first of these is only soluble in water, and possesses a fermentative and catalytic action. It contains the toxic portion of Koch's tuberculin, and has all the chromophilic, physical, and chemical qualities of volutine. He therefore calls the substance TV. One gram of TV is more powerful than one litre of tuberculin. The second substance is a globulin, and is soluble only in neutral saline solution. He calls it TGL. It is likewise toxic, in the sense of tuberculin. The third substance, or group of substances, is soluble in alcohol, ether, chloroform, etc., and is non-toxic. Having removed the three groups, there remains the body of the bacillus, which he calls the rest-bacillus (bacillus remains). The rest-bacillus retains the shape and tinctorial qualities of the tubercle bacillus. By means of suitable preparation one is able so to modify the condition that an amorphous substance can be delivered, which is directly resorbable by the lymphatic cells of the guinea-pig, sheep, rabbit, goat,

ox, and horse. The amorphous substance can render the cells oxyphilic or eosinophilic. The state of immunity of the organism evolves parallel with the metamorphosis of the cells under the influence of TC. The fundamental fact is that TC possesses the power of giving rise to tubercles. The tubercles thus produced do not caseate, nor do they break down. He is convinced that TC can be prepared *in vitro* in such a form that it can be employed safely in human therapeutics.

DR. L. FLICK, the International Delegate of the United States, then made a proposition that the next Congress should be held in Washington.

On a vote being taken, the invitation was unanimously accepted, and it was announced that the date had been fixed for 1908.

THE HENRY SAXON SNELL PRIZE.

THE Subject given in March last for the essays in competition for this Prize was "Domestic Sanitary Appliances, with suggestions for their Improvement." Thirty-one essays were sent in and have been brought under the consideration of the Council.

The majority of the essayists gave a more or less complete and generally well-illustrated description of existing sanitary appliances, pointing out which they considered the best, and the proper mode of fixing them, but failed to comply with the most essential condition of "suggestions for their improvement."

The Council desire to commend the following four essayists for what they consider to be general historical essays containing matter of interest and shewing careful study of the subject:—

"Spero Meliora."	"Cordon Sanitaire."
"Nairobi."	"Efficientia."

The Council, however, do not consider that any of the essays are of sufficient merit to deserve the Prize offered, and therefore withhold the award on this occasion.

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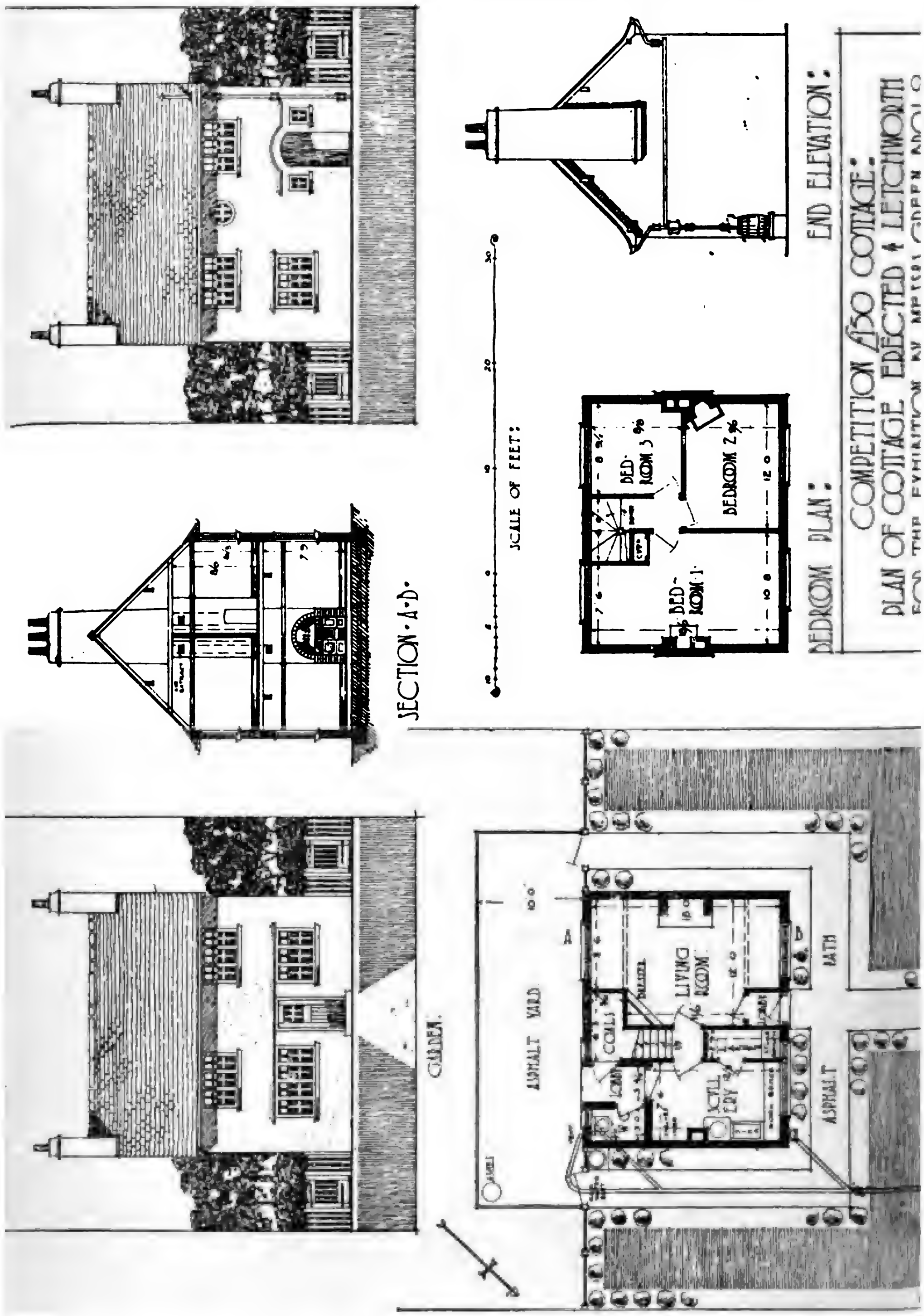
Cottage awarded the £100 Prize in Class I.



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DISCUSSION ON

RURAL HOUSING.

The Construction of Healthy and Cheap Cottages—The Exhibition at Letchworth.

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(FELLOW.)

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At Sessional Meeting, London, November 14th, 1905.

JOHN F. J. SYKES, M.D., D.Sc.
(FELLOW.)

MR. ALDWINCKLE has kindly undertaken to deal with the matters of greatest interest to the architect and the builder, and I propose to deal with the subject from the medical and sociological point of view.

I shall, therefore, introduce the subject by a brief review of housing in general, and rural housing in particular, considering more in detail the general principles involved in the construction of cottages from the point of view of health and well-being, and concluding with a few additional remarks upon the cottages at Letchworth.

I.—Housing in General, and Rural Housing in Particular.

(A) *The Movement of Population.*

The increase of population in England and Wales at the last three census periods was found to be 14, 11, and 12 per cent., respectively. Yet during the past thirty years it has been estimated that the rural districts have lost one quarter of their population, while the towns have more than correspondingly gained.

This displacement of population from the country into the towns

appears as a common process of advancing civilisation. It is an accompaniment of improved education, and the acquisition of knowledge, which bring with them higher and wider aspirations, that the town becomes more attractive, the country less attractive.

The great attraction of the town consists, amongst other things, in greater scope, more numerous and more varied opportunities for employment, greater activity, more chances for unfulfilled ambitions, higher payment for services rendered, more evening recreations, (especially in winter), the library, the concert hall, the theatre, more schooling facilities for children, and so on.

Advancing civilisation means advancing education, and, having disclosed the great world and its doings and held up great men and great deeds to the admiration of children, it is unreasonable to expect them to be content to be "cribbed, cabined, and confined" for the rest of their lives.

The lesser attraction of the country is due, amongst other things, to the more or less absence of the above advantages, to the stagnation, monotony, and dulness, which even the pleasures of Nature are insufficient to compensate, particularly in winter-time; and when agriculture declines, refuge is taken in the workhouse or the town.

(B) *The Distribution of Buildings.*

Commencing in the early days with the homestead, the accumulation of buildings has proceeded by development through the hamlet and village to the town, the city, and the capital, and the urban housing question is brought about by increasing pressure towards the great centres.

The metropolitan housing difficulty stands by itself on account of the enormous distances, the immense complications of transport, and the high cost of land, building, and transit.

But the rural housing question proceeds from different causes. Agriculture has become less profitable, so that the funds available for construction have become smaller, and the building of labourers' cottages has for years been almost at a standstill, whilst the old cottages have been in many places more and more starved of improvement and repair. The result has been that, although the rural population has diminished, the old cottages have become obsolete and decayed faster, and they have fallen to ruin or been demolished as insanitary; and in some parts this process has gone so far as to cause overcrowding in the remaining cottages. In short, the rural housing question has been brought about by the obsolescence, decay, and ruin of cottages for want of funds to repair, and for want of wages to pay the rent when repaired.

(c) *The Return to the Land.*

The cry of "back to the land" is the expression of an earnest attempt to fundamentally alleviate, if not to actually cure, the two great housing questions, the one in the city and the other on the land, by the progress of one operation, a progress that will drag at its wheels numerous problems to their solution.

To accomplish this it is not necessary to make the city less attractive, but rather to make the country equally attractive. The first great attraction must be the possibility of earning a living wage. Agriculturally, small holdings may do something towards this, but they do not go far enough. Industrially, in some cases works may be transferred from the city to the country, in others new works may be set up on the land, these events have taken place in some instances successfully; but some years ago I was told, by one who ought to know, that workpeople would not follow the migration of works. It has become obvious that it is not only necessary to provide living wages to attract the workers into the country, but also recreations to retain them there, and living places to house and fix them there. Hence the success of Bourneville, Port Sunlight, etc. As soon as there is a prospect of a living wage providing the prospective rent, the path of the capitalist, or the company, or the society is smoothed to provide the funds for the erection of healthy living-places to house the wage-earners, and the field is open for the organisation of gregarious recreations. Provide the wage-earning power, the cottages, and the recreations, and all the institutions of an educated community which make life worth living will follow as the day follows the night.

If some of the industrial works and workers of cities can thus be attracted to the country, not only will the pressure of population and the housing question in cities be relieved, but also the great traffic and transit difficulties of large centres may be alleviated, as these difficulties are created by increasing centralisation. "Back to the land" in its manifold operations means in one word "decentralisation," and this appears to be the object of Garden City, bringing the town to the countryman and not the countryman to the town.

But, what about rural building by-laws, the main object of illustration by the Cheap Cottages Exhibition? Here we reach a paradox. If a number of agricultural and industrial undertakings are to be located within a given area, and cottages and other buildings are to be erected within that area a new town will be created, in fact a city is contemplated. With the growth of population and the growth of buildings in size and

proximity, a growth in the restrictions upon buildings, provisions for open space about buildings, for the height of houses and width of streets, etc., will be absolutely necessary, whether they are in the form of bye-laws or in any other form.

This control must be not rural, nor urban, but such as befits a future city, and not an ordinary city, a model city, with the ideal of a garden attached to each house. Hence Garden City, the promoters of which very properly pride themselves upon having the prescience to provide for the far distant future in their scheme, is the latest and best illustration of the necessity for local control over streets and buildings, whether that control is expressed in a scheme, or by agreements, contracts, or by-laws.

It is not necessary to pursue this paradox, because we are not here to discuss a city of houses brought together in an excellent manner as a city, but as if consisting of isolated cottages fitted for housing labourers in sparsely populated rural districts.

If it were advisable to plan dwellings for the working classes in a mathematical manner so as to house families on the plane, that is, on one floor level, it would be possible, by simply multiplying the stories, to construct dwelling houses to suit the conditions of the rural, semi-rural, suburban, urban, city, or capital area, on the zone system in vogue in Germany. It would even be an improvement on that system, inasmuch as it would permit of both zonification and stratification in the expansion of hamlets, villages, towns, and cities. But, in dealing with variable humanity and the variety of forms and materials available, such mathematical precision is not attainable, although as a line of thought it is permissible. Architects and builders rebel against iron-bound restrictions which reduce elementary natural beauty and the combinations of simple artistic proportions to such a scientific accuracy that the very joy of living becomes unlovely by the precise ugliness of our visual surroundings. The unnecessary ugliness of arrangement, outline, construction, and colouring in some of our hamlets and villages is appalling. Repulsiveness in appearance is not necessary in order to secure health and convenience. To make the country more attractive the cottages must be made more attractive in their rural simplicity, and to this end meretricious devices are unnecessary and undesirable. The added attractions of the simple rural cottage are not to be found in human decoration but rather in the embellishments of Nature.

II.—The Provision of Cottages from the Point of View of Health and Well-Being.

(A) *The Requirements of the Dwelling.*

It being understoood that we have not to deal with town problems, such as the difficulties of width of roadways and of forecourts in relation to the height of buildings, and of the width of open spaces at the rear in relation to other buildings, the questions of construction are much simplified. In fact, in the isolated or detached cottage we have the dwelling in its simplest form, and no great complication added when considered as semi-detached in a pair, or as terraced in the centre of a group of three or more cottages.

In order to arrive at a clear conception of the minimum requirements of a dwelling-place intended to attract a present-day workman's family, we must briefly review the elementary points essential to health, the accommodation necessary for decency, and certain points demanded for comfort and well-being.

Drawings of insanitary cottages of the old and obsolete type were published by the Royal Agricultural Society in 1896, in the second edition of a pamphlet entitled "Cottage Sanitation in Rural Districts," the principal object of which was giving advice for the remedying of existing defects. The rural housing question has travelled a long way since then.

(B) *The Area of Land Necessary.*

In considering the erection of a modern rural cottage, the first and most important question to settle is how much land will the cottage require? The answer to this question will depend upon whether there is a water-supply system, a sewerage system, and a scavenging system. If the first does not exist the other two will not. If the first does exist, the second will sooner or later follow, because it is known that when the watermain is substituted for the well, the quantity of water used is enormously increased. If the first and second exist, the water-carriage of excreta will also exist, and if all solid refuse be burnt, there will only be the ashes to dispose of, whether a scavenging system exist or none.

Assuming that none of these systems is available, it will be necessary to provide each cottage with about a quarter of an acre of land. This would almost preclude the construction of cottages in terraces, because, assuming the frontage of a cottage plot to be 25 feet in width, the plot would require to be 435 feet long, a proportion of almost 18 to 1. Therefore cottages to be erected under such conditions must be either

detached, semi-detached, or in a group not exceeding three or four, and have about them, respectively, a quarter, a half, three-quarters, or a whole acre of land, to properly dispose of their liquid and solid refuse. In addition to this a well must be sunk, the rain-water must be stored, an earth closet must be used, to which the tenant must regularly attend, as well as to the disposal of the slop-waters, and to the disposal of the solid refuse. The amount of land required where all refuse has to be disposed of on the premises by the tenant himself, cannot safely be reduced below the fifth of an acre.

If all the refuse can be removed then instead of four or five cottages to the acre, the number can be increased to eight or ten, and still remain a garden village. It will often be found that the proportion is eighteen or twenty cottages to the acre in a small hamlet.

(c) *The Primary Objects of the Dwelling.*

Before passing to the construction of the cottage, let us consider the primary objects we must have in view in erecting a dwelling-place.

Firstly, the roof must exclude falling rain, hail, and snow; the walls, high winds and driving rain, etc. In this country there is not long occasion to exclude excessive heat beyond the direct rays of the sun, which are easily fenced by blinds; but defence against cold must be obtained by a roof space or an upper story, and thickened or hollow or party walls, and by avoiding an excessive amount of glass; a complete concrete base must exclude ground air and vapours; and the capillarity and porosity of walls permitting dampness must be counteracted by a damp course below, by coping above unless overhung by eaves, by guttering under eaves, and in some places by channelling at the foot.

Secondly, provision against effluvia, vermin, and small intruders. The causes and sources of effluvia must be removed from the proximity of the dwelling; hollows, loose skirtings, crevices, and other harbours of vermin must be avoided; small undesirable intruders through openings must be provided against by gratings and similar devices.

Thirdly, the admission of daylight and sunshine, breezes and air. The admission of daylight must be by ample but not excessive window space; sunlight by such orientation as to catch the most sunshine; breezes for the perflation or through ventilation of a cottage in the country are more easily admitted than excluded, unless the designer or constructor is exceptionally perverse; air may be readily admitted for ventilation if all the windows and parts of windows are made to open, and also to partly open

without causing draught by one of the several well-known methods, but it must be borne in mind that ventilation or a current of air requires an outlet as well as an inlet, unless the opening be large enough to permit exchange of air by diffusion; hence the great value of an outlet-flue, preferably with a fire-grate also.

(D) *The Accommodation necessary.*

There are two ways of approaching the subject of necessary accommodation; the wrong way is to erect a structure and then fit human beings into it, the right way is to ascertain the requirements of human beings and then to provide for them in the structure to be erected.

Excluding for the moment the questions of the supply of water and the disposal of liquid and solid refuse, the most necessary requirements to be provided for in the human dwelling are: sitting, sleeping, food-storage, cooking, warming, ablution, clothes washing, clothes drying, fuel-storage, deposit of refuse, and excretion. The clothes will be dried in the garden of the cottage. The sanitary convenience will be approached from the open or from an open lobby. The portable refuse receptacle and the fuel-store will be situated also in an open lobby or in a properly protected space adjoining the cottage. Within the cottage proper will be the wash-house and scullery, the food-store, the kitchen, and the sitting and sleeping-rooms. Here we come to the debatable question of the number of habitable rooms to be provided in a cottage. Amongst other objects of housing the working classes in the country as compared with the town is that of providing them with more dwelling room; therefore the restricted accommodation of the densely-packed town must not be taken as a standard for the country. Further, the country cottage must be constructed to house a family, not a single man, or woman, or part of a family, or the smallest family, but rather the average sized and even a large family.

Regarded in the biological aspect, the human individual expands in requirements from the single man and woman, to the wedded couple, the small family, and possibly the large family. But the dwelling does not expand with equal facility. Consequently, if the dwelling is constructed to meet the minimum demand, it will prove insufficient for the maximum demand of the family. One of the most reluctant acts to take is to be compelled to turn an increasing family out of an unexpansive dwelling. Anyone who may have to take this unpopular course is not to be envied. It will be said that if a cottage is so constructed as to house an average

family, when occupied by a small family the inevitable lodger will be taken in. But when the family increases in size the lodger may easily find accommodation elsewhere, whereas the family would have much greater difficulty in moving, and if all cottages were constructed of the smaller size the difficulty would become an impossibility.

Now, it must be pictured that the family will sooner or later consist practically of three sexes, the boys, the girls, and the married couple, and this means the use of three rooms as sleeping-rooms; if, therefore, there be only two bed-rooms, the kitchen will inevitably be used as a sleeping-room, whereas if there be three bed-rooms and the family be small, one of the bed-rooms may be used as a parlour. In any case we may take as a standard that there should be in the cottage at least three habitable rooms, a kitchen and two bed-rooms, and preferably four habitable rooms.

(E) *The Actual Construction of the Cottage.*

Raw Materials and Made Parts.—The materials available for construction are now numerous, stone, brick, concrete, cement, plaster, wood, and iron (in several forms), and various combinations of these substances, also slates, tiles, slabs of various substances, together with various kinds of framing and reinforcement, and other materials and combinations known to architects and builders.

The choice of materials has not only to suit the locality and to satisfy the demands of health, but also to have strict regard to cost, and cost is of two kinds, immediate and deferred. If to the original cost of material, putting together, erecting, and finishing, the after cost of maintenance and repair have to be added, it will often be found that the apparently cheapest material is in the end the most expensive. Therefore, durability makes for ultimate cheapness. There is the further aspect that early dilapidation and decay may bring certain sections of the Public Health and Housing Acts upon the scene.

In the cathedral city of Rheims the old houses, good solid structures, were nearly all built of blocks of chalk, dug out of the well-like quarries which now form the famous champagne cellars; and one is prompted to ask whether none of our English chalk is of a kind suitable for building purposes, or is the simple labour of shaping chalk blocks too costly in a country where the unemployed abound?

With regard to the additional expense of materials in unfavourable localities, the importation of cheap made parts ready for putting together may require such an expenditure upon transport and appliances as to bring no advantage. Each local community must act upon its own judgment:

the construction of a cottage must be based upon the materials available on the spot or obtainable from the shortest distance, with due regard to health and well-being.

Modes of Erection and Arrangement.—In erecting a cottage there are two methods available of excluding dampness and ground vapours from below. The one, the usual way of inserting a damp course in the outer walls and spreading a bed of concrete over the space enclosed by the outer walls; the other by erecting the cottage, walls and all, upon a platform of concrete. The latter appears to be a delightfully simple manner of sealing the surface with a view to health requirements, but it is for architects to say how far it is feasible to adopt this method at small cost, not only for a light cottage of one story, but also for cottages of two stories, whether built of light or of heavier materials. In these days of reinforced concrete it should be brought within the limits of practical construction (*diagram* 1, *page* 622).

In an isolated building the minimum of outer wall with the maximum of enclosed space is obtained by the circular form, to which there are obvious objections; the next minimum is the polygonal form, almost equally objectionable. And the next is the square form, which possesses many other advantages over other possible forms. Similarly there is less outer wall in a semi-detached than in a wholly detached cottage, and less still in a terraced cottage than in a semi-detached (*diagram* 2, *page* 622).

Another point in which we must rely upon the opinions of architects, is whether it is cheaper to erect a cottage of one or of two stories in height, the accommodation provided being the same in either case with the exception of the staircase, but some of the other relative advantages and disadvantages of one and two stories may be briefly considered. If a cottage is situated in a hollow it may be more desirable to place the bedrooms in an upper story to obtain more airiness and to avoid rising mists, but if situated on a hill one story will present less wall surface to the cold blasts of winter. An upper story will keep the rooms below of a more equable temperature, and in these rooms two-thirds of the twenty-four hours are spent, divested of heavy out-door clothing, and unstimulated by out-door exercise; on the other hand when the rooms are all on one ground floor level some of the outer walls of the living-rooms are kept warmer by the rooms being placed at the side instead of overhead. The same effect of equability of temperature of some of the outer walls is obtained by party walls in semi-detached cottages and groups of three or four cottages constructed in two stories (*diagram* 3, *page* 622).

Greater protection from extreme temperatures is afforded to the tops

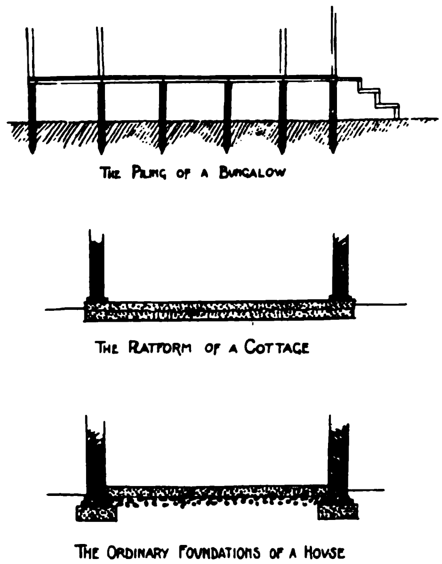


Diagram 1.
Showing Section of Foundations.

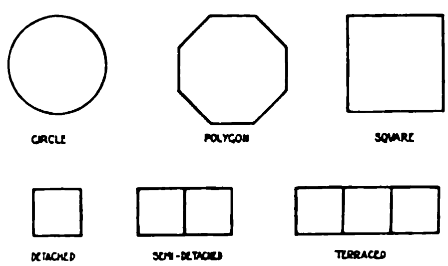


Diagram 2. Showing Proportion of Outer Wall to a House.

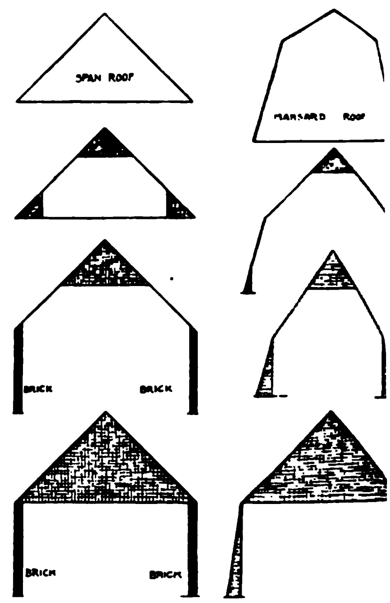
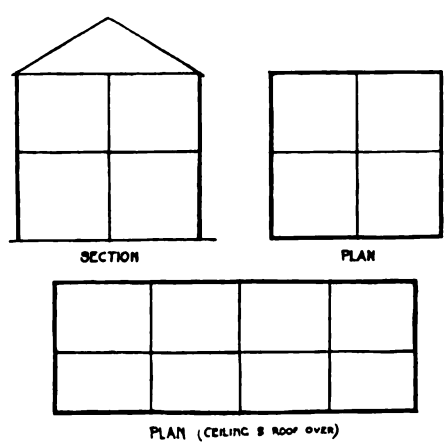


Diagram 4.
Showing Proportionate Protection of Roof.



{ 2 Stories.
  8 Rooms.
{ Outer wall surfaces, 16.
  Inner wall surfaces, 16.
{ Ceilings under roof, 4.
  Ceilings under floors, 4.

{ 1 Story.
  8 Rooms.
{ Outer wall surfaces, 12.
  Inner wall surfaces, 20.
{ Ceilings under roof, 8.
  Ceilings under floors, 0.

Diagram 3. Showing Proportion of Outer and Inner Surfaces.

of rooms when the roof space of a pitched or pent roof is entirely enclosed by a ceiling than when it is only partly so enclosed, or there is no ceiling at all. In fact, the simplest and most effectual method of obtaining equability of temperature is to enclose a layer or body of still air, which is the best and cheapest non-conductor. In this manner an upper story makes the temperature of a lower story more equable. A flat roof, a mansard roof, or a pitched roof, without ceiling is very cold throughout the winter and hot at midsummer (*diagram* 4, *page* 622).

The situation of the fireplaces is another factor that influences the temperature obtainable. In a detached cottage, if they are situated against the outer walls, a large part of the heat is dissipated and lost to the interior, whereas, if situated against inner walls or centrally, more of the heat is retained in the building. This does not apply in the same manner to semi-detached or terraced cottages if the fireplaces are situated against party walls. It should be taken as a rule that every habitable room should have a window and a fireplace and flue for proper lighting and ventilation. In a bedroom a fireplace is indispensable for heating in case of sickness or nursing, and, as the flue is the foul air extractor, it should be regarded as an exception to permit a bedroom to be constructed without a fireplace, and then only when more than two bedrooms are provided, and even then a foul air extraction shaft should not be omitted. Of course, in the kitchen the fireplace is intended mainly for cooking, and should be provided with a proper range (*diagram* 5, *page* 624).

This leads to the consideration of the position of the fireplace, window, and door in relation to each other in a room. If they are all situated on one side of a room the ventilation, and especially the through ventilation or perflation, will certainly suffer, and also the heating or the lighting, possibly both. This unusual arrangement is simply described by way of illustrating the importance of relative positions. The ideal condition is that the fireplace, window, and door should each be separately situated in one of the four walls. The more centrally in the wall the window is situated the better will be the distribution of light, and the more directly the fireplace faces the centre point of the room the better the heat will be distributed. This admits of a fireplace in one of the angles, but the further the fireplace is away from the window and door the better the distribution of ventilation. The same applies to the door when situated near an angle of the room, and especially in relation to the window, as it is through door and window that perflation takes place. It should be fully realised that ventilation of an inhabited room is not sufficient to make it healthy; it also requires to be perflated or through-ventilated daily, in order to

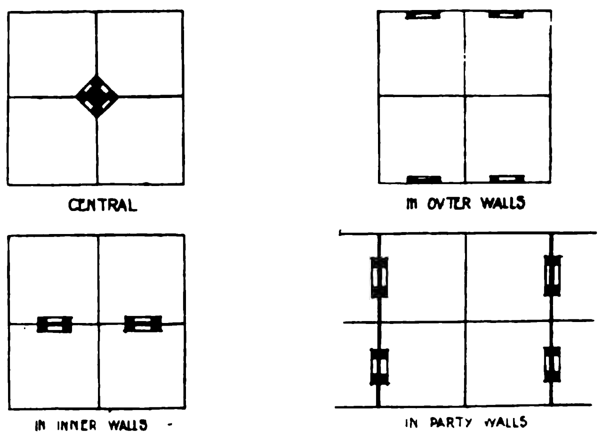


Diagram 5.

Showing Relative Positions of Fireplaces.

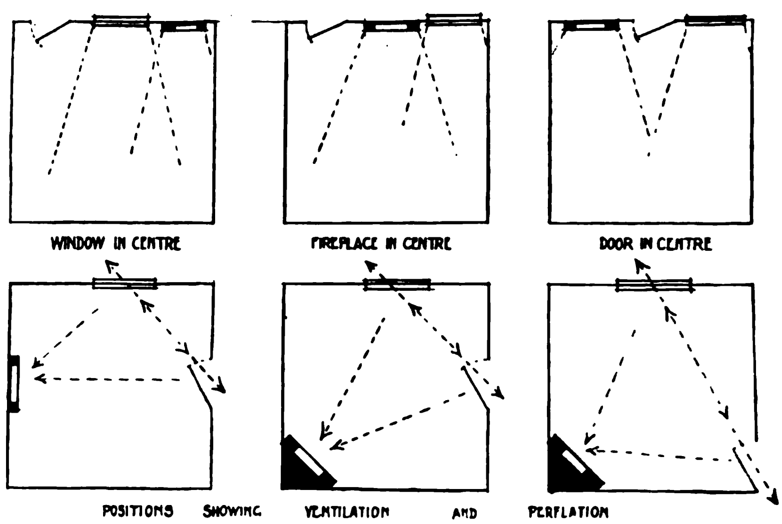


Diagram 6.

Showing Relative Positions of Fire, Door and Window.

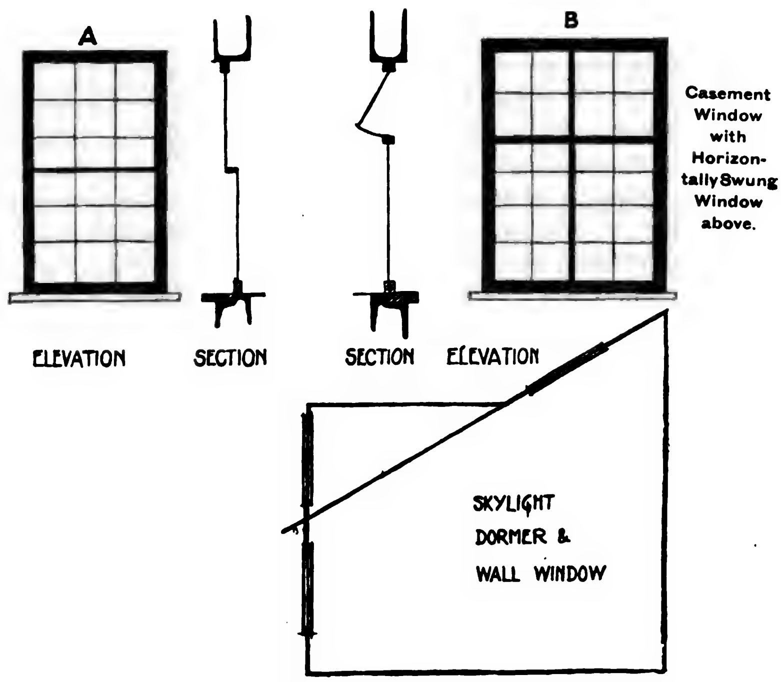


Diagram 7.
Windows.

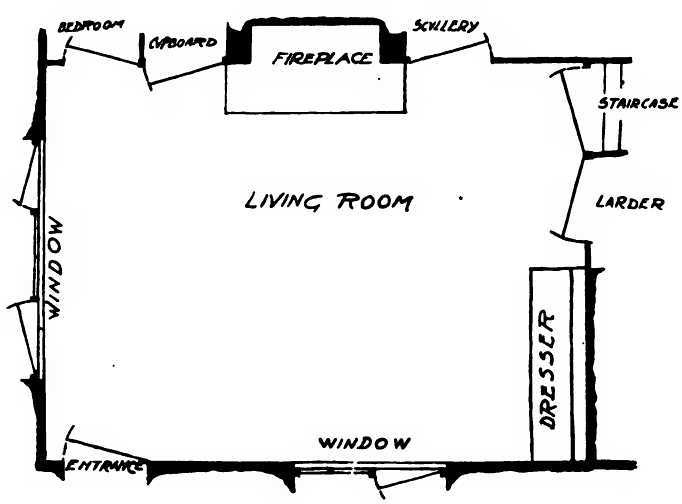


Diagram 8.
Doors.

forcibly blow away the organic emanations that cling so persistently to surfaces and give the characteristic odour of humanity to rooms continuously inhabited (*diagram* 6, *page* 624).

In regard to the vertical situation of the window of a room, it is an axiom that the top of the window should reach as near as possible to the ceiling, so as to throw the light as far as possible into the room, and to ventilate to as high a point as possible. The latter possibility is dependent upon whether we ventilate by the lower, middle, or upper part of the window, and whether the window opening will be an inlet or an outlet. Window openings are nearly always inlets, particularly if there be a fireplace in the room. The objection to low windows is not so much on the ground of ventilation, as this can be otherwise provided for, but that they render a room dark and gloomy, and even lateral extension does not relieve the mental depression. They are more suited to semi-tropical climates, where sunshine and brilliant daylight are less welcome visitors than here. Again, the height and width of the window are dependent upon whether the sash or guillotine window or the casement window be adopted. If the casement window be adopted a hopper window above will overcome some of the greater objections to the casement. In an upper story the window may be situated at three different heights in relation to the room, that is, of three kinds: a wall window, a dormer window, and a skylight window. The skylight window is obviously the least desirable form. With regard to the wall window, in a room half in the roof, with overhanging eaves, it is very gloomy and depressing, apart from the question of ventilation, and it is only possible to remedy this by adding a dormer window, which will add to the expense of construction. In passing, it may be generally said that where windows will serve for admitting the outer air without draught, other kinds of wall inlet ventilators are an unnecessary expense (*diagram* 7, *page* 625).

There is something also to be said about the third most prominent feature of a room, the prosaic door. Although the door should be so situated as to assist through ventilation, it is not desirable to multiply the number of doors to a room to the extent of rendering it almost unhabitable, not only by reason of the numerous draughts created, but also by leaving so little room for furniture. In a large, active family in a moderate-sized room, with a window, fireplace, and three or four doors, it must be a puzzle to find a draughtless, warm, and undisturbed sitting-place in winter-time. Again, in a small lobby or passage, the too close proximity of two or more doors awkwardly hung is very likely to painfully impress a person in more senses than one. From personal experience in

e case, it was necessary to pass through a lobby into a room, and then ck again and shut the outer door before being able to go up-stairs. ıd yet, again, an outer door that gives entrance directly into the kitchen d living room is likely to admit such a winter's blast as to make the :upants shudder. An external porch or internal lobby to temper the nd is almost a necessity (*diagram* 8, *page* 625).

The height and the area of rooms are, within limits, debatable points. ıe object of increasing the height is to obtain more cubic capacity or space and better ventilation, the object of diminishing the height is to ve expense, and the practical course must be a compromise, somewhere tween 7 and 9 feet, say 8 feet or thereabout, with a modification for the per story over parts of the area to allow of the inclination of the roof. good human working standard to take is that the ceiling should be at ch a height that a tall man standing on the floor cannot touch it with stretched hand. The area of the kitchen and living room must be large ough to accommodate the whole family at the same time, at least 150 ıare feet, better still 200, and best of all 250; in case this may be ought excessive, remember that such enclosed areas, 8 feet in height, ll only provide sufficient cubic space for 3, 4, and 5 persons, respectively, 400 cubic feet per head, and even if dimished to 300 cubic feet per ad, for 4, 5, and 6 persons, omitting furniture.

The model bye-laws for houses let in lodgings or tenements require a nimum of 300 cubic feet per head in a room exclusively used for sleep-g, and, if not used exclusively as a sleeping apartment, 400 feet. Some thorities have wisely adopted a single standard of 400 cubic feet in all cumstances for dwelling purposes. The sufficiency of cubic space is pendent upon the means and the use of the means of ventilation, and e greater the cubic space the more readily the means of ventilation will put into use. At the census and in housing schemes a standard of two rsons per room is adopted. As the person constructing a cottage cannot arantee that an intended bed-room shall never be used by a tenant for y other purpose he must estimate at 400 cubic feet per head and two rsons per room at the least, that is to say he must provide at least 800 bic feet of space, this with 8 feet in height will require 100 square feet floor space or thereabout. Increase of size of course means increase of pense, and here again we must compromise.

As a good working standard, the desirable area for a bedroom may be ken to be a hundred square feet or thereabout, and for a living room uble this area. If only the occupants would learn and practise the tues of the fresh-air treatment and additional bed-clothing there would

be little fault to find with the size of such bedrooms. Any considerable lowering of the minimum suggested for original construction, as for instance, providing cubic space sufficient only for one person, will permanently hamper ventilation, leave no margin, and ultimately lead to overcrowding.

A bed-recess in a sleeping-room is an unhealthy enclosed space in which to spend eight hours of slumber, unless possessing a window opening into the external air. On other grounds, in a family-dwelling, bed-recesses are undesirable. For similar reasons it is undesirable that one bedroom should be approached only through another. Cutting off a slice of a bedroom to form a passage-way to one or more bedrooms beyond shows a clumsiness of design, but where a passage, corridor, or lobby is essential, it must be sufficiently lighted and ventilated.

A few other points of detail may be mentioned as conducive to health and well-being. The food-store, larder, or pantry, should face as near north as possible, should have hard impervious surfaces, a permanent direct opening into the external air, and protection against the entrance of flies from without by close wire netting, and from within by an accurately fitting door. A water-butt or tank serves two very useful purposes: by intercepting the rain-water it provides soft water for washing purposes, and where there is no sewerage system, diminishes the amount of liquid to be disposed of upon the garden surface in wet weather.

When the washhouse or washhouse and scullery is situated in the main building the steam from the copper should be excluded from the house by a door, and provision should be made for its escape from the upper part of the washhouse, either through the upper part of a window or by a special opening. The provision of a special bath and hot water system is a considerable additional expense, and a large quantity of water can be heated in a copper. A portable slipper or hip bath, or the homely tub has this advantage that it can be moved about, and a hot bath can be taken in either of the bed-rooms in greater privacy and under more comfortable conditions than in a scullery or wash-house, the carriage of water being the only trouble.

The sanitary convenience should not only be approached from the open or an open lobby and be sufficiently lighted and ventilated, but it should also not have any possible aerial communication with the food-store.

(F) *Questions of Cost.*

There is the cost of land, the cost of construction, the cost of maintenance, and the local charges. The cost of land is very variable.

At the Hampstead Garden Suburb the cost of some 240 acres (about a quarter of a mile by one and a half mile) was £466 per acre. At the Letchworth Garden City the cost of some 3,800 acres (three miles by two miles) was £40 per acre. When land is bought by the square mile it is cheaper than when bought by the acre, and the nearer a town and the larger the town the higher the price.

The local rates or charges will partly depend upon whether there is a water-supply system, a sewerage system, and a scavenging system, and made roads, and all the other various local installations.

The cost of construction will depend upon the local geology, the cost of raw materials, of made materials or parts, and of transport, and also (not least important) of local labour.

The cost of maintenance will depend upon whether the construction is of a temporary, semi-permanent, or permanent character.

But *the most important question* that awaits an answer, or series of answers, is, in regard to each particular cottage plan: What is the relative *cost* of erection and cost of maintenance *of the same cottage* repeated and constructed *in different materials*?

There is a further question: For what amount can the cottage be mortgaged? probably about the fairest test of relative value.

(G) *Rural Building By-Laws.*

To the deputation to the Local Government Board towards the end of last year, the President, speaking of the Code of Building By-Laws for Rural Districts published in 1903, said that: "In his judgment, in dealing with cottages in purely rural districts, stability was not a matter of concern to anybody except the owner or tenant, and he decided that that provision should be left out altogether. In regard to prevention of fire, so long as the cottages were detached, he thought the by-laws need not in any way interfere; but with reference to sanitation, it was the duty of the Department to frame by-laws which should be applicable to all that was involved in the matter. . . . . if it was examined, he believed it would be found to be on the whole a workable code." *(Times, 18th November, 1904.)*

A return issued by the Local Government Board shows that in England and Wales, there are 668 rural districts, in 246 of which there are no by-laws at all for the control of new buildings. In 106 districts and in parts of 32 districts there are by-laws based on the Rural Model; in 169 districts and in parts of 114 districts there are by-laws based on the Urban Model.

If By-laws and Building Acts were based more upon the zone system as in Germany, and varied more according to the proximity and height of houses, upon a sliding scale, so that the owner of a building site might realise that he could not eat his cake and have it, many of the present difficulties would be overcome. I have ventured to condense the desired objects in the terms "zonification" and "stratification."

The amount of regulation that domestic buildings require increases directly with the density of the buildings upon space, and of the dwelling-rooms within cubic space. It diminishes with the diminishing density of dwellings in houses, and of houses upon the land, until a point is reached at which no regulation at all is required.

The continuous and permanent occupation standard of construction is partly the grievance of the townsman who desires to recruit his health in the country during the summer, a reversion to the instincts of our pastoral ancestors, who had their winter-houses and their summer-houses to suit the season, and changed their abodes just as we change our clothes. In these days of open-air treatment it would be absurd to prohibit sleeping in the open air, on the ground of injury to health, provided that there is protection against wet from above, and dampness from below, and that the body heat is retained by sufficient clothing. It is merely a question of season. Camping out is delightful in the summer; between seasons somewhat more provision against climatic conditions is required; but in the winter it is desirable, and for the young and old necessary, to provide an artificial climate in an artificial structure.

The hopelessness of framing general by-laws to suit the seasons causes them to be framed on the winter model. But one is tempted to ask whether it is not possible to relax or set aside the by-laws for temporary dwellings occupied only during the summer, just as relaxations or exemptions are allowed for temporary buildings.

Neither do the Model By-laws appear to contemplate, in the construction of a rural cottage possessing its own area of land, the disposal of the rain-water, slop-water from one sink, the contents of the pail of one earth-closet, and of one ash-skip upon its own land.

One is tempted to ask why in all cases receptacles for excreta and ashes are not required to be of the portable type, and the contents to be removed periodically beyond a fixed distance from a dwelling, and either disposed of by digging into cultivated soil or by depositing in a common receptacle maintained and regularly cleared by the local authority.

The principal by-law of the Urban and old Rural Model Code to which exception has been taken is that which requires "walls to be con-

tructed of good bricks, stone, or other hard and incombustible materials." Jevertheless, it is a remarkable fact that of the cottages at the Exhibition bout sixty per cent. are of brick, and about ten per cent. of other ard and incombustible materials. The reason obviously is that this makes for durability as well as prevention of fire, and it is for the former uality rather than the latter that hard and incombustible materials are referred. Such durable materials are not only proof against fire but also gainst vermin, and other inconveniences.

Special provisions against fire are unnecessary for detached buildings only one story in height, or even of two stories if there be an easy rop from the windows. Instant escape is necessary from an upper floor onstructed of wood, or lined with wood, as the wood in time becomes dry that it burns like "wild-fire"; no time is left to think, and only nough to drop to safety.

Of course, open air space is, after all is said and done, the main health oint, and recommendation 6 of the Report of the Interdepartmental Com-ittee on Physical Deterioration is very much to the purpose. "Buildings nd open Spaces.—Local authorities in contiguous areas which are in rocess of urbanisation should co-operate with a view of securing proper uilding regulations, in furtherance of which end the making of building y-laws to be approved by the Local Government Board should be made ompulsory on both urban and rural authorities; attention should also be iven to the preservation of open spaces with abundance of light and air. By the use of judicious foresight and prudence the growth of squalid ums may be arrested, and districts which hereafter become urbanised nay have at least some of the attributes of an ideal garden city."

III.—A FEW ADDITIONAL REMARKS UPON THE EXHIBITION.

The first thing that struck me was that the cheap cottages exhibited art under obviously advantageous circumstances, with complete water ipply and sewerage systems, and made roads. The absence of wells and initary conveniences in common use, and the self-contained arrangement f each cottage, will be great boons to the occupants.

The next thing that impressed me was the heterogeneous assemblage f small domestic buildings. In a pioneer exhibition intended to call forth ew materials, new methods of construction, and improved arrangements enerally, the fullest scope was wisely given in order to produce the most ariety for purposes of comparison, and this result has been attained. ut, to the observer and student of the subject, a multiplicity of detailed

facts is confusing, and he comes away filled to repletion with valuable ideas that require to be assorted, co-ordinated, and generalised.

One sees various types of structures that may be first grouped according to the social class to which they are fitted, the labourer's and artizan's cottage, the fisherman's cottage, the clerk's small suburban villa, the townsman's week-end retreat. There is one type distinctly absent, namely, the bungalow, although the term bungalow has been freely used. A bungalow (bangla or Bengali) is a one or two-story dwelling-house, the main characteristic of which is, that it is erected on piles, piers, or an elevation above the surrounding surface, with a verandah or balcony partly or wholly around. A single story or wooden construction does not alone constitute a bungalow, neither do the "arty" bits and "fallals" attached to a week-end retreat or small summer residence for the country or seaside.

Classifying the cottages, or pairs or groups, in one and two stories, about fifteen per cent. are of one story, and are of various materials, brick, concrete, wood, steel-framing, and composite materials.

There is a catalogue classification of temporary buildings and permanent structures, but in the latter are to be found some structures no less temporary than those in the former. It must be admitted that it is difficult to draw a sharp line, as it is dependent upon durability of materials and combination, and the test of time has yet to be applied.

Still, classification is possible under the heads of brick and other incombustible materials, and it is remarkable that of the cottages about sixty per cent. are in the former and ten or more per cent. in the latter category. So that over seventy per cent. conform in this respect to the the urban by-law as to main walls. Ten per cent. or more are wooden cottages entirely or mainly, and the rest are of various combinations and composite materials. The half dozen or so of entirely wooden cottages give an excellent demonstration of the modern style of cottage in this material. Some of the wooden or partly wooden cottages are not only fit for inland use but also should make admirable fishermen's cottages on the sea coast in the gaps protected from wind and driving rain.

It would be valuable to know the resistance and durability or life of building materials, especially for outer walls and roofs, and The Royal Sanitary Institute could not undertake a more useful task than in endeavouring, by tests and trials, to ascertain the relative merits of the different materials in the market, not only from the point of view of life of the substances, but also of the health of those who may have to live surrounded by them.

It is comforting to see that in about one-third of the cottages the fireplaces and flues are more or less centrally grouped, and in about another third that they are placed in inner walls or party walls, or mainly so. In the remaining approximate third they are in or against outer walls.

The term "habitable room" appears to have been overlooked, so that habitable and uninhabitable rooms have been classed together, and small washhouse-sculleries included as habitable rooms.

In some cottages too much prominence is given to points of lesser weight, and insufficient thought to matter of great weight. I was much struck by the small consideration in some cases paid to warmth, thin walls, thin roofs, large window spaces, and many doors to the rooms, absence of entrance lobby or protected porch, and in the open country on the Hertfordshire hills I pondered—and wondered what would happen during a bleak winter. In very few cases are the windows too small, in some they are too large and inconveniently constructed for ventilation in the cold season, but in the majority the proportion and situation of window spaces is fairly well adjusted. The same applies to the doors, but in some instances they are too numerous, and in one or two instances very awkward if not dangerous. In some cottages the staircases are not only dangerous on account of the absence of hand-rail to the straight run from top to bottom, but are also appalling in their steepness. On the other hand the combination of scullery and kitchen is almost entirely avoided, or where adopted a sitting-room has also been provided.

In reference to the thirteen prizes it is to be observed that with the exception of two for the Class for wooden cottages, all the prizes are awarded to cottages the main walls of which are constructed of hard incombustible materials, seven of brick, and three of concrete or cement. No doubt if it had been foreseen there would have been another class for cottages partly of combustible and partly of incombustible materials, in which the second prize of Class I. would have been placed. It is to be noticed that the first prize cottage in Class I. is so planned as to be erected either detached, semi-detached, or in terrace, and in the latter case the fireplaces and flues would be in party walls. Three of the thirteen prize cottages are of one story, and one of the two-story cottages has the upper story entirely and the others mainly in the roof. Nevertheless, it is so much easier to be destructive than constructive that in the face of a novel situation and considerable difficulties our heartiest thanks are due to the pioneers.

T. W. ALDWINCKLE, F.R.I.B.A.
(FELLOW).

THE idea of an Exhibition of Cheap Cottages originated with Mr. J. St. Loe Strachey, the Editor of *The Spectator*, who in October of last year published in *The Country Gentleman and Land and Water* a vigorous article entitled "In Search of a £150 Cottage."

In this article it was pointed out that the rural labourer cannot afford to pay more than 3s. per week rent for his cottage, which amounts roughly to £8 per annum. At present a cottage costs about £250, exclusive of the land, and 4 per cent. upon this amounts to £10, to which must be added another £2 for rates, insurance, and annual repairs, making a rent of £12, exactly 50 per cent. more than the labourer can afford to pay. If a cottage could be built for £150, exclusive of land and water supply, a rental of £8 a year would represent 4 per cent. on the capital: £6, with £2 for rates, repairs, sinking fund, and insurance. Mr. Strachey then asked the very pertinent question, "Is it possible to build for £150 a cottage which shall be a suitable home for the rural labourer?"

The Exhibition of Cheap Cottages at Letchworth is an attempt to afford a practical answer to the question.

It comprises cottages actually erected, and also a series of plans and specifications, some applying to the erected cottages, and some to cottages which have not at all events been erected at the Exhibition.

The erected cottages are divided into four classes as under:—

CLASS 1.—A detached cottage, to cost not more than £150, containing the following accommodation: One living room and one scullery or kitchen, scullery not less than 7 ft. 6 in. high. Three bedrooms (two with fireplaces), not less than 7 ft. 6 in. high, the total cubic space in the three rooms to be not less that 2,000 feet.

CLASS 2.—A pair of cottages giving the same accommodation, the cost not to exceed £300.

CLASS 3.—A group of three or four cottages, no one cottage to contain more than six rooms, including scullery, the cost not to exceed £35 per room.

CLASS 4.—A detached cottage or pair of cottages, giving the same accommodation as in Class 3, the cost not to exceed £35 per room.

A Prize of £100 was offered for the best cottage in Class 1, and prizes (amount not stated at the time) for the best exhibit in each of the other classes.

The cost of building was in each case to be exclusive of architect's fee

and builder's profit. Fencing was not to be included, nor drainage and water supply fittings *outside* the cottage. This was done because the sewers and water mains which the Garden City possesses were not considered to be invariable necessities obtainable in all rural districts.

The following prizes were also offered:—

£100 by an anonymous donor for the cheapest cottage in the Exhibition.

£50 by the Associated Portland Cement Manufacturers for the best cottage built of cement concrete.

£50 by the Committee for the best wooden cottage.

Also one or two minor prizes.

Sixty-four exhibits have been specially erected for the Exhibition, either single, in pairs, or in groups of three or four. There are thirty-nine in Class 1, eleven in Class 2, three in Class 3, and ten in Class 4; also one exhibit unclassed. The expression "exhibit" includes all the cottages, either in a pair or a row. The whole of these are fully completed buildings, practically ready for occupation. The exhibition is thus unique, affording in the most practical form possible an object lesson of the greatest value.

As the primary object of the Exhibition is to show whether it is possible to produce a £150 cottage, it will be convenient to deal principally with Classes 1 and 2, which for our purposes can be grouped together. Classes 3 and 4, which represent rather a higher scale of cottage, will be dealt with later on, but in much less detail. The prize-winners will be dealt with first in each class.

In order to afford the means of comparing the sizes of the several cottages, the area of each building has been given so far as it could be ascertained, and also where possible the cubical contents.

It will be necessary at the outset to set up some standard by which to judge the character of the various exhibits, and to consider what are the essentials in a cottage which, costing £150 or thereabouts to build, shall be suitable for an agricultural labourer paying a rent of 3s. per week.

In the first place, for the purposes of economy in construction, the cottage should be a simple rectangular self-contained building, with a simple span roof, free from cross gables, dormers, and other breakings up of the roof-line (however artistic they may appear), as well as all bay windows and other projections. This is laying down a drastic law, but the exigencies of cost must be paramount. The eaves of the roof should have a projection of 12 inches or more to protect the walls from rain.

Some of the competitors place the upper story wholly in a mansard roof, which is a somewhat cheaper arrangement than brick walls, but there would be some lack of warmth in the bedrooms.

It must also be borne in mind that this class of tenant has but little to spend on fuel; therefore the windows must not be large, and the external walls must be of a material and of a thickness capable of excluding cold and damp. Some of the cottages in this Exhibition have external walls of 4 in. timber framing covered externally with plaster or weather boarding, others with thin plaster or concrete slabs (say 3 in. or 4 in. thick), while others have windows out of all proportion to the size of the rooms. To keep these cottages comfortably warm would require an amount of fuel quite beyond the means of the labourer. Yet this matter cannot be ignored. Warmth is of vital importance in a cottage home.

As regards the accommodation to be provided, there are required a living room, scullery, and three bedrooms. A third room, or parlour, is quite unnecessary. It adds to the cost of the building, and is only used on rare occasions. If a parlour is provided, the living-room is reduced in size, and after all this latter is the room in which the family pass most of their time. This living-room should be the largest room in the cottage, with not less than 160 ft. floor area, and should have a small range (with oven but no boiler), well made, but economical in fuel. In the winter the cooking will be done in this room. There should be a dresser or cupboard dresser. Through ventilation is desirable for this room. The floor should be of red tiles, not wood; the latter cannot be kept clean and sweet. If the floor of the living room is of wood, the floor-boards should be nailed down direct to the concrete, which should have a layer of hard core under it. In one cottage there is a cement margin round the room, a few inches wide, an arrangement which prevents the damp from reaching the floor boards. The entrance to the cottage should be through this room; not direct, but through a lobby, and a north or east aspect for this entrance should be avoided. There should be a good-sized stone or tile threshold outside the entrance, and a pent roof over. It is important that this living room should be comfortable, and that it should be free from draughts from doors, etc. In some of the cottages exhibited, the living room has as many as *four doors!* without a single comfortable corner.

The scullery should have a floor area of not less than 80 feet. It should have a small range for cooking in summer. Means should be provided for removing the steam rising from the copper. If there is a bath it should be in the scullery, and it can have its hot water supply from

the copper. The cottage taking the first prize has no bath, and it is more than likely that the cottager would prefer a more primitive arrangement. In some of the cottages there are provided a combined model cottage range, copper, bath and hot water supply, which would cost at least £15, or one-tenth the whole cost of the cottage. It is advisable that there should be the means of getting from the scullery to the bedrooms on the upper floor without passing through the living room. This does not mean that the stairs should lead direct from the scullery or from the living room, as this allows the steam and vitiated air from the ground floor to ascend into the bedrooms. There is much to be said in favour of an outside washhouse, so that the washing can be done without the steam entering the cottage. The cottages built by Lord Carrington on his estate have this arrangement. All this, however, tends to increase the cost.

Every cottage requires a back door, and this should be in the scullery. The door should lead to a roofed lobby open at one end or side, so that from this lobby access can be had to the coal store and w.c. This gives sufficient air separation to the latter, while it can be approached under cover, which is desirable in bad weather. It is important that the w.c. should not lead direct from the interior of the cottage. It may be considered desirable that where there is an earth closet the access should be wholly external and not from a lobby, or even that it should be an outbuilding. Wherever the access to the closet, coals or wash-house is wholly external, there should be a paved way leading to them, of tiles or other suitable material.

A coal store and a properly lighted and ventilated larder are required (both of only very moderate size). The larder should lead from the scullery. Where the coal store also leads direct from the scullery, there should be some external means of getting the coal into the store without going through the scullery.

The stairs should not be too steep, with not more than one set of winders, and should have a handrail; also a window (to open).

It is preferable to have all the bedrooms on the upper floor. In the first place it is more economical in construction, as all these rooms can be partly in the roof. It is also more convenient for family purposes, as if one bedroom is placed on the ground floor, the children sleeping there will not be under parental control. It is only fair to state, however, that there are several very good cottages in the Exhibition which have a ground floor bedroom. When these bedrooms are much in the roof the windows should be in the side gables so as to avoid dormers. It is advisable that the parents' bedroom should communicate directly with one of the other bedrooms to allow of the supervision of the very young children. The

position of the bedstead has apparently not been considered by many of the competitors.

The ground floor should not be less than 7 ft. 9 in. to 8 ft. high from floor to ceiling. There does not appear to be any advantage in increasing the height by exposing the joists over. A flat ceiling is certainly more sanitary. For the bedrooms, when partly in the roof, the mean height should not be less than 7 ft. 9 in., with vertical wall not less than 5 feet in height.

Reference has already been made to the size of the windows. It is advisable that they should be near to the ceiling in all rooms, and if a part of the upper portion could be made hopper fashion, so as to be kept open at night, so much the better.

A large amount of cupboard space is not desirable. A food larder and a cupboard dresser should be sufficient. Other cupboards only mean dark places difficult to keep clean. It is preferable to put in bedrooms and elsewhere, a good deal shelf with a deal rail under having a few good cloak hooks. Unventilated and dark spaces under the stairs are most undesirable as cupboards.

The internal finishings must necessarily be very simple and inexpensive. All walls should be plastered internally, except the coal store and possibly the larder, and all salient and internal angles in the same should be slightly rounded. Wall papering is undesirable in any case; distemper being preferable. Skirting boards are undesirable as the space behind them harbours vermin. A cement skirting is preferable. There should be no wood floors to the ground floor story, unless there is a bedroom. Well made ledged doors hung with strong purpose-made strap hinges (not ordinary cross garnets) are sufficient, except perhaps for the front entrance doors. A plain rounded architrave will be sufficient. The internal reveals of the windows should be in plaster and rounded with a deal head and window board.

The utilization of the rain water is very important. This water is usually collected in butts, which eventually become very foul. In one of the exhibited cottages, the rain water has been collected into an external iron tank placed about the level of the first floor, and is then "laid on" to the sink, copper and bath.

In external appearance there should be the true "cottage" character. This need not be costly; simplicity itself will do a great deal. One competitor states in his description, "We have found that a few years' growth of shrubs and creepers quite eclipses men's efforts at decorating exteriors."

The last and by no means the least essential is that the cottages

should be substantial and permanent in character, to such an extent that individuals erecting them can borrow money upon them on mortgage.

As to the question of one-story and two-story cottages, there is, of course, a good deal to be said on both sides. In a one-story cottage the cost of the stairs is saved, and the foundations can be slighter. On the other hand in two-storied cottages, the rooms on the ground floor are undoubtedly warmer by reason of having rooms over them, and the bedrooms are not open to the objection of being close down to the ground. One great objection to a one-story cottage is that it occupies considerably more land, and requires, therefore, more frontage.

It would seem preferable, therefore, to build these cottages of two stories, and also to build them in pairs. This arrangement, which is perfectly consistent with a good plan, saves one main wall in two cottages, and also gives each cottage three external walls instead of four, thus saving fuel in warming the rooms. The width of the garden is not limited to the frontage of the cottage, and can be as much more as may be desirable. When the amount available is very limited the cottage in pairs is almost a necessity.

Of the cottages exhibited in Classes 1 and 2, only a few come within even a measurable distance of being erected for a prime cost of £150. Of a large number it must be said that they could not be built for £250. Some of the competitors, indeed, seem to have been perfectly reckless as regards cost, aiming only at producing artistic buildings or cottages of such a size and of such internal and external finishings as would render them only suitable for week-end middle class bungalows, or at the least for artizans' dwellings with a rental of 6s. to 7s. 6d. per week. A great deal of the Exhibition is thus very misleading in this respect, and is calculated to produce a false impression on the public mind, which may do harm rather than good to the cause in the interests of which the Exhibition was projected. As a matter of fact, several of the cottages are already let at rents considerably exceeding 3s. per week.

Of the 50 exhibits in Classes 1 and 2, the following numbers show certain features, as under:—

39 are single, 21 in pairs, 9 one story, 41 two story, 38 have living room and scullery, 12 parlour, kitchen, and scullery, 7 one of the three bedrooms on the ground floor, 33 have simple rectangular plan and roof, 7 have the main entrance door leading direct into the living room, 43 an entrance lobby leading to living room, etc., 11 the stairs leading direct from the living room or scullery.

33 have water-closet or earth-closet with external access, 3 water-closet

or earth-closet with internal access, 14 water-closet or earth-closet leading from lobby with open end.

24 have fireplaces and chimneys well grouped together in interior of cottage.

27 have a bath.

25 have 9-inch brick walls, 5 11-inch hollow brick walls, 5 external walls of concrete, 3 external walls of thin concrete or plaster slabs, 4 are of timber with tiled roof, 3 of timber construction throughout, 2 external walls part brickwork and part timber framing.

The above table indicates that there is a great variety both of arrangement and construction in the various cottages.

No. 14, which has obtained the first prize in Class 1, is a simple rectangular self-contained building of the pure cottage type, of a distinctly substantial and permanent character, and undoubtedly deserves the award which it has obtained. The architect is Mr. Percy Houfton, of Chesterfield. The cottage comprises living-room, scullery (no parlour), and three bedrooms. The front entrance is through a lobby which leads to the living room. From the living-room we reach a central (well-lighted) lobby which gives access to the scullery and to the stairs. The living-room is 18 ft. by 12 ft. (extreme dimensions), the actual floor area being 194 ft., it has a good window at each end, thus providing cross ventilation. This room is so planned that it will be bright, comfortable, and free from draughts from doors (there are only two in the room). There is a good range (rather too large) and an excellent cupboard dresser. The fireplace has a semicircular arch in salt-glazed bricks, and looks very well. The floor is of tile quarries. The scullery (12 ft. 3 in. by 7 ft. 6 in.) has a copper, sink, and "working bench" under the window. There is no provision for getting rid of the steam from the copper. One thing is wanting in the scullery, and that is a small range for use during the summer; there is ample room for this. There is no bath. There is room in the scullery for this. The back door leads from the scullery to a roofed lobby with open end, giving access to the w.c. and the coal store. The door of the w.c. might with advantage have been placed nearer to the open end of the lobby. A well-lighted larder leads from the scullery. The whole of the ground floor, except the living room, is paved with granolithic cement. The stairs are good and well lighted. The window originally did not open, but, apparently in consequence of criticism, this has been rectified, although the opening is a very small one. The arrangements on the ground floor are such that access to and from the scullery

and the bedrooms can be obtained without passing through the living-room. The first floor is very well planned, there being no wasted space. The bedrooms are respectively 18 ft. × 10 ft. 8 in. (extreme dimensions), 12 ft. × 9 ft., and 8 ft. 9 in. × 8 ft. 9 in. Two of these have a fireplace. All are good and well lighted. The total cubic space of these bedrooms is 2,700 ft.

The ground floor is 7 ft. 9 in. high, and the upper floor 8 ft. to the ceiling and 6 ft. 3 in. to the wall plate.

The internal finishings of this cottage are simple and suitable. All the walls are plastered internally, except the coal cellar, and the salient angles are rounded. The internal doors are three-quarter inch ledged, well made, and hung with very good wrought-iron strap hinges, with latches and pins. The windows, which are not too large, have casement sashes with good fastenings. All the rooms have deal skirtings and picture rails. There are deal rails and cloak pegs in the scullery and inner lobby. There are ventilators in all the chimney breasts. The rooms are finished in "Duresco" distemper. The interior is cheerful and pleasing throughout, and there does not appear to be a dark corner anywhere. The external walls are of 9-in. brickwork covered with rough cast, limewhited. The foundations are of brickwork twice the thickness of the walls. There is a layer of concrete 6 in. thick under the whole internal area of the building. The roof is a simple span roof without dormers and with good projecting eaves, and is covered with local plain tiles. The aspect of the front door is north-west. A pent roof over this door would be an improvement. Externally the building looks like a cottage. There is one defect in the plan, which is apparently unavoidable in a building designed on these lines, and it is that fireplaces cannot be grouped together inside the building, but are, on the contrary, in the external walls, thus involving loss of heat. The area of the cottage is 478 sq. ft., and the cubic content 10,272 ft. The cost per cubic foot is 3½d.

It is interesting to note that this cottage, which is undoubtedly a good and cheap one, could be erected in any district without infringing the by-laws, except as regards the height of the rooms, and a few minor details.

As regards cost, the Judges state that they are satisfied that this cottage has been erected for the stipulated sum, and this, therefore, cannot be questioned. But it may be safely inferred that in some other districts, and under other circumstances, the cost would be somewhat higher. Nevertheless, it may be put down as the best and one of the cheapest cottages in the Exhibition.

There appears to be no reason why this cottage should not be erected in pairs, with a reduction of about £12 for each pair.

No. 23, (Architects, Messrs. Bennett & Bidwell, Letchworth), which takes the second prize in Class 1, is a cottage of quite a different type from No. 14. It is somewhat irregular in plan, with a roof cut up with cross gables, and in construction it has the external walls partly of 9 in. brickwork, but mostly of timber framing, covered externally with weather boarding. Existing by-laws would have to be very considerably modified before a cottage of this type of construction could be built, and the question arises as to whether in regard to durability, warmth and dryness such a building could be recommended for general application. It comprises living room, kitchen (in reality a scullery) and three bedrooms. The front entrance (north-west aspect) is through a lobby giving access to living room, stairs, and larder. The living room (15 ft. × 12 ft.) is well lighted and has a good range and dresser. The scullery (12 ft. 9 in. × 8 ft. 9 in.) leads from the living room and contains fireplace, sink, copper and bath, the latter with cold water supply only. There is a fire-opening but no grate. The larder is unplastered and one wall is of timber framing with no internal lining. Its position, leading from the front lobby instead of from the scullery or living room, is not good. The w.c. has entirely external access. The ground floor is paved with tiles, except the larder, which has a cement floor, and is 7 ft. 6 in. high. The stairs are steep but well lighted with no wasted space on the top landing. There are three good and well lighted bedrooms; one of these is 8 ft. 6 in. high, the other two 7 ft. 7½ in. high, all being partly in the roof. There is no access to the bedrooms from the scullery without going through the living room. The fireplaces and chimneys are grouped together in the interior of the cottage. The internal finishings are simple and suitable. The doors are inch ledged without architraves. Plain deal finishings to windows. Deal picture rail to all rooms. Tile skirting to ground floor rooms; much preferable to wood skirtings. The eaves of roof project about 18 inches. This is a distinctly cheap cottage. The area is about 480 sq. feet. Cost per cubic foot 4⅛d.

No. 35, single (Messrs. Potter & Co., Ltd.), which takes the third prize in Class 1, is again quite a different type of cottage, being one story, with external walls of concrete 7 in. thick, rough-casted externally. No special apparatus is used for the concrete walls. The living room, 14 ft. by 12 ft., is reached through the entrance lobby, and is a cheerful room with a simple cottage range. There is a good scullery with fireplace. An annex at the rear contains wash-house with copper, coal store, and w.c.

This annex has a flat concrete roof. There is a paved way leading from back door of scullery to wash-house, coals and w.c., which is a good arrangement. Of the three bedrooms, two lead from the living room, and one from the scullery. All are good and contain a total cubic space of 2,590 ft. The scullery is cement paved. All the other rooms have deal flooring nailed direct upon five inches of cement concrete on five inches of hard clinker. This is an excellent arrangement and avoids space under floors. These rooms are all 8 ft. 6 in. high with flat ceilings. The internal finishings are very good. The doors are 1¼ in. panelled and moulded with locks. Inch rounded deal skirting fillet. In each bedroom there is a good shelf and under same a deal rail with four brass double pegs. Also a good shelf in scullery. There is a larder and a closet or pantry. There is no bath. Pent roof over external door. There is a mantel register in each bedroom. The internal partitions are of 3 in. concrete. The fireplaces are all well together in one group in the centre of the cottage. The roof is a simple one hipped all round, without any dormers, and with good projecting eaves, the rough-cast being brought up to same with a curve. The rooms throughout are of fairly large size and well lighted. As far as possible there has been an avoidance of timber in construction. This is a good type of one-story cottage, but the area of the building is large, viz., 779 sq. feet, the whole is on a scale somewhat in excess of the requirements of a labourer's cottage, and the building would certainly cost a good deal more than £150. Price stated at 4½d. per cubic foot, but at this price the cubic contents would bring the cost up to £180.

No. 35, pair (Messrs. Potter & Co., Ltd.), takes the first prize in Class 2. This is a pair of cottages of the same plan and details as the single cottage, except that the outer walls are 7 in. thick, and comprise framing of 3 × 3 in. steel joists with steel lathing on each side, rough-cast externally and plaster internally, leaving a closed-in air-space of about 4 inches. This construction for an external wall should be a fair non-conductor of heat and should keep out the damp, but to a less degree than a 9-in. brick wall, in comparison to which it would be less permanent and most probably but very little cheaper. The area is practically double that of the single cottage by the same firm.

No. 70 (by Mr. A. H. Clough, Burley, Ringwood), which takes the second prize in Class 2, is a pair of cottages presenting several excellent features. The ground floor has 11 in. brick hollow external walls with rough-cast, but the upper floor is entirely in a mansard roof. This is done to reduce the cost, and there is a good deal to be said for such an arrange-

ment. The whole of the internal arrangements are upon a very cheap scale. The living room, 12 ft. 6 in. × 12 ft., is entered from a small lobby, which also leads to the stairs. There is a small range of excellent type, only 2 ft. wide, which appears likely to be economical in fuel. This room has a deal floor. The scullery, 9 ft. × 7 ft., has a copper and a small fireplace. There is no access to and from the scullery and the bedrooms without going through the living room. There is no bath. The larder is under the stairs, and has a small window. The ground floor is 7 ft. 6 in. high. The coal store and w.c. are in an annex with external access. One bedroom (with fireplace) is on the ground floor. As to this Mr. Clough says: "This arrangement is far more economical of space and cost than any method of placing three rooms over two." The stairs are steep and are enclosed only by match boarding. There are two very good bedrooms on the first floor, 12 ft. × 12 ft. and 15 ft. × 9 ft., and each has a mantel register fireplace; they are 8 ft. 9 in. to ceiling. The three bedrooms have a cubical capacity of about 2,600 feet. The fireplaces and chimneys are well grouped together internally. The internal finishings are simple. Doors 1½ in. panelled and moulded, with locks. This is a type of cottage which is suggestive of cheap construction, and one likely to be built for something near the stipulated sum. The upper rooms would be somewhat cold in winter, owing to the mansard roof. It would tend to improve this as regards the two end rooms if the two end walls were carried up in hollow brickwork as high as the first-floor ceiling. The area of the pair, including the annexes, is about 870 sq. feet. The cost is stated to have been £230 for the pair, which works out at a little over 3¾d. per cubic foot.

No. 67 (Co-partnership Tenants' Housing Council), which takes the third prize in Class 2, is a pair of cottages upon a much larger scale than No. 70, and suggests the reflection that as regards cost this pair must necessarily be much more expensive, and very considerably in excess of £300 the pair. The rooms are all large and well lighted; in fact, the window-space would entail a serious consumption of fuel in the winter. The cottages are, however, very bright and cheerful. An open porch leads to the living room (16 ft. × 13 ft. 6 in.), floored with jarrah wood. There is a range set in jambs of salt-glazed bricks. The scullery has copper and bath, but no fireplace. The stairs, which lead direct from the living room, are good and well lighted. There are a tool house, coal store, and w.c., all leading from an inclosed lobby entered from the outside, and with no connection with the interior of the cottage. It would be preferable, however, for the lobby to be open. The ground floor is 7 ft. 9 in. high.

There are three very good bedrooms (two with fireplaces); they are 8 ft. high, partly in the roof, and are of large cubical capacity. The internal finishings are plain and suitable; the external appearance is good and pleasing. The external walls are of 9 in. brickwork. These cottages are far beyond the requirements of an agricultural labourer paying 3s. per week. The area of the pair is 1,100 sq. feet, and the cost works out at about 3½d. per cubic foot. There is no access to the scullery and the bedroom without going through the living room.

No. 71 (Mr. Clough), which receives the prize of £100 for the cheapest cottage for value given, is similar in plan to No. 70, but instead of a mansard roof, the first floor has external walls (4 ft. 3 in. high to springing of roof) of vertical timber framing, covered externally with tiles. It is stated by the Judges in their report that this cottage has been erected for £120. The area, including the annex, is about 435 feet. The cost (£120) works out at a little over 4d. per cubic foot. This cottage certainly deserves the prize which it has obtained.

No. 80 (Mr. W. Troup, Architect), which receives the first prize for a timber cottage, is a plain rectangular self-contained building, the external walls of which consist of 4 in. timber framing covered externally with insulating paper and weather boarding, and plastered internally. The external door (east aspect) leads direct into the living room, 16 ft. 3 in. × 11 ft. 9 in., a very cheerful room, with rather too much window space. The range is too large for a labourer's requirement. There is a good dresser, also a good larder leading from the living room. The scullery, which has a step down from the living room, is of irregular shape, partly because a kind of bathroom has been provided. There is no fireplace. There is no access to the scullery and bedrooms without going through the living room. The coal store is not a good one. The stairs, which lead from the living room (doorway at foot), are very good and well lighted. There is one bedroom on the ground floor with a fireplace. The ground floor is 7 ft. 6 in. high, with boarded floors, except to the scullery. The upper floor contains two good-sized and well-lighted bedrooms, each with a fireplace. These rooms, however, are so much in the roof that the vertical wall is only 4 feet high to the springing, and the flat ceiling is only 4 ft. wide. The height to ceiling is 8 feet. The cubical capacity of the bedrooms is 2,400 feet. Most of the internal partitions are of only filleted vertical boarding, and are highly inflammable. The internal finishings are simple and suitable. The doors are ¾ in. ledged. The fireplaces are well grouped together in the centre of the building. The roof is of good pitch covered with pantiles; it has

good projecting eaves, and is not broken up in any way. This is an excellent cottage as regards plan and arrangement, and one is tempted to ask the question, Why not build it in brick? The external appearance is of the pure cottage type. The area is 529 sq. feet, and the cost works out at 4·39d. per cubic foot.

No. 81 (Messrs. Smith & Brewer, Architects), which takes the second prize for a wooden cottage, is of somewhat irregular plan, with gabled roof. The external walls are of 4 in. timber framing, covered externally with weather boarding. The rooms are all of good size. There is no fireplace in the scullery. A bath is provided. The fireplaces are grouped together in the centre of the cottage. The area is 372 sq. feet, and the cost works out at 5·39d. per cubic foot.

No. 58 (G. Fraser, Architect), which takes the prize for a concrete cottage, is a rectangular self-contained building, with a simple roof hipped all round without dormers and with good projecting eaves. There is an entrance hall and staircase leading to the several rooms. There are parlour, kitchen, scullery, and three bedrooms. A bath is provided. The external walls are built of 9 in. concrete blocks, and the external appearance is very good. The general scale and finish of the building are, however, much in excess of the requirements of a labourer's cottage, and it could not be erected for anything approaching £150. It would be interesting to know whether, and to what extent, these concrete walls are cheaper than a 9 in. brick wall. It is doubtful whether anything is gained by treating the concrete so as to imitate stone; it would have been better to cover the whole externally with Portland cement. The area is 662 sq. feet.

In addition to those cottages which have received prizes in Classes 1 and 2, there are several of a good and suitable type, and I will now describe a few of these, still limiting my remarks to those in these two Classes, and to those cottages which appear to be most suitable for their intended purpose.

No. 9 (Messrs. Williams & Hodgson, Architects), is a simply-planned building of the pure cottage type, and is self-contained, with a simple roof without dormers. There is a front lobby which leads to both kitchen and scullery. The kitchen (or living room) is of fair size, and is cheerful and well lighted, and has a small range. The scullery is small and contains copper and bath, but no fireplace. The pantry leads from the scullery. One of the bedrooms is on the ground floor and leads from the kitchen, and has a fireplace. The stairs lead from the scullery, and are good and well lighted. Apparently no coal store has been provided. There are

two good bedrooms on the first floor, each with a fireplace. These fireplaces and chimneys are well grouped together in the centre of the building. The internal finishings are simple and sufficient. The external walls are of 9 in. patent hollow bricks covered with rough-cast. This is a good cottage, and one that would be as cheap to build as any in the Exhibition. The area occupied is about 416 feet. The cubic contents are about 7,300 feet, and the price works out at 4·d9. per cubic foot.

No. 19 (L. F. Crane, Architect) is a well-planned artistic cottage, but the external walls are of timber framing covered with weather boarding. The timber framing is substantial, the studs being 6 in. × 2½ in., and the corner posts 6 in. × 6 in. An open porch leads to living room and w.c. The living room is very good; the stairs lead from it. Good scullery with copper and bath, but no fireplace. The first-floor joists are exposed. The stairs are good and well lighted, and have a handrail. There are three good bedrooms, but some space on this floor is wasted by a passage. The fireplaces and chimneys are well grouped together in the centre of the cottage. A most interesting cottage, which would be even better if built in brick. The area is 475 feet, and the price works out at about 5¼d. per cubic foot.

No. 20 (by The Bourneville Village Trust) is a small and compact self-contained rectangular cottage with simple roof, and is designed upon a very moderate scale. The entrance is at the side through a lobby, which leads to living room, sitting room, and stairs. There is a sitting room and a living room, but no scullery. The sitting room is small and evidently intended as a parlour. The living room is intended as the kitchen, and contains an oven grate, a small food cupboard, a sink, and a tip-up bath. The living room would seem to be a curious place in which to put and use a bath. There is no copper. It is not clear where and how the washing is to be done. There is a small coal store under the stairs. The stairs are nearly all winders. There is external access to the w.c. The bedrooms are fair. A feature of this cottage is that there is no back door, the only external door is at the side, and this will serve for all purposes. It is an arrangement which has inconveniences, and is not suggestive of privacy when there are other cottages adjoining. The external walls are of 9 in. brickwork with rough-cast. This is distinctly a cheap cottage, but the accommodation provided is very limited. The area is 376 feet. The cost is stated to be £138 9s., including the bath, which works out at 4·44 per cubic foot.

No. 34 (Mr. C. G. Agate, Architect) is another good and simple cottage, rectangular, self-contained, and with simple roof without dormers.

The living room is entered direct from the outside (aspect south). It is a good room, with good dresser, but a poor range. The scullery contains copper and bath, but no fireplace. The stairs, which are steep, lead from the living room. The first floor is well planned without wasted space in landings, but two of the bedrooms are rather small. The fireplaces and chimneys are well grouped together. The internal finishings are very simple. The external walls are of 9 in. brickwork with rough-cast. The area is 401 feet. The cost is stated to be £140, or 4½d. per cubic foot.

No. 50 (Messrs. Baker & May, Architects,) is a compact rectangular self-contained cottage, with simple roof. The entrance lobby is rather large. There is a good living room. The scullery contains copper and bath, but no fireplace. One of the bedrooms is on the ground floor. The stairs lead from lobby. There are two good bedrooms on the first floor. The fireplaces and chimneys are grouped together in the centre of the building. The external walls are of 6-in. timber framing, plastered both sides and pugged. This building has the appearance of a cottage, and is free from any extravagance. It would be better if the external walls were of 9-in. brickwork. The area is 438 ft. Cost, 4½d. per cubic foot.

No. 69a (J. A. Brodie, Architect), is a single cottage constructed wholly of concrete slabs, for walls, roof, and floors; these slabs are 6 in. thick, made from destructor clinker, slightly reinforced with steel. They were made at Liverpool and brought to the site, and were placed in position by means of a special derrick. It contains parlour, kitchen and scullery, and three bedrooms. The roof is flat, or nearly so. The idea of the concrete construction is a good one, and the interior of the cottage is pleasing and comfortable, but the exterior is very unsightly, and not at all suggestive of a labourer's cottage. It is not at all certain, moreover, that this kind of construction would be any less costly than that of a cottage with brick walls and the ordinary construction. The area is about 500 feet. Cost 3½d. per cubic foot.

No. 85 (W. Marshall, Architect), consists of a pair of one-storied cottages built for the Marquis of Salisbury. It is a simple rectangular building with low springing roof, the windows rising into plain dormers. The living room is entered from a lobby common to the two cottages. The range is too large. The scullery is small, and the sink in a bad position. There is a fire opening but no grate. There is no bath. Of the three bedrooms, one leads from the living room, one from the scullery, and one bedroom is only reached by passing through another, a very undesirable arrangement. This could be remedied by forming a lobby between the two rooms. The rooms are 7 ft. 6 in. high to ceiling, and 7 ft. to spring-

ing of roof. The internal finishings are good, and the cottage is well-built throughout. The external walls are 11 in. brick hollow, faced with good red bricks. The coal store and w.c. are in a detached timber building. The area of the pair is 1,216 feet, without the out-buildings. The latter 113 feet. The cubical contents of cottages and out-buildings is about 17,750 feet, which at £300 for the pair works out at slightly over 4d. per cubic foot.

We can now deal with two of the exhibits in Classes 3 and 4. These are professedly cottages giving somewhat more accommodation than in Classes 1 and 2; practically six rooms instead of five to each cottage; and the cost must not exceed £35 per room.

No. 01 (Mr. Geoffrey Lucas, Architect), which takes the only prize given in Class 3, is a row of four cottages, or rather two rows. They are of picturesque appearance. The cottages are not all exactly alike in plan, but the general features are the same. Each cottage contains living room, scullery, and three bedrooms. One cottage has a bath. The living room is entered direct from the outside without a lobby. The stairs lead direct either from the living room or scullery. The back door of scullery opens into an annexe with part of one side open, forming a bicycle shed, from this leads the w.c., the door of which faces the scullery door, not a good arrangement. There is no fireplace in the scullery. The stairs are rather steep. Space is lost by a badly-lighted passage on the upper floor. There is one good bedroom and two small ones. Only one bedroom has a fireplace. The internal finishings are simple. The external walls are of 9 in. brickwork, the upper story being finished with lias lime rough-cast. The area of the four cottages is 1,750 feet. The cost is stated to be £762 11s. 11d., or 5¼d. per cubic foot.

No. 79 (Mr. A. Randall Wells, Architect), which receives the only prize in Class 4, is a simple rectangular self-contained cottage, with plain span roof without dormers, and has the somewhat large area of 697 sq. feet. There are sitting room, kitchen (living room), and scullery. There is a front entrance lobby leading to sitting room and kitchen.

The kitchen is 15 ft. by 14 ft., and has an open hob-fire and an independent Norfolk oven. There are three doors to this room. The stairs, which are steep, lead from a rear lobby connected with the kitchen. There is a back entrance door to this lobby, so that with another back door from the scullery, there are three external doors, which would appear to be unnecessary. The scullery has a small grate, a copper, and a tip-up bath. The larder and fuel store are too large. The ground floor is about

8 feet high. The joists above are all exposed. The parlour has a wood floor, the rest of the ground floor has tiled quarries. There are three large bedrooms, but there is a certain amount of floor space wasted in a long passage. The internal finishings are simple. The external walls are of 9 in. brickwork without rough-cast. The whole of the planning is upon a somewhat large scale, and it would not be possible to build this cottage for anything approaching £150. The area is 698 feet, and the cubical contents 13,000 feet, which at £150 works out at 2·64d. per cubic foot. The Judges state that the actual cost has been £170, which would bring the cost per cubic foot to 3d. This cottage was entered in both Classes 1 and 4. The Judges suggest that the partition between the centre bedroom and the lobby on the first floor might, in many cases, be omitted, thus giving two inter-communicating rooms for parents and young children.

Lord Carrington's Cottages.

In a letter to *The Times* on this subject, Lord Carrington gives some very valuable information as to labourers' cottages, which he has erected on his estate, at an average of *£156 13s. 0d.* each, and having, through the courtesy of his agents, Messrs. J. Carter Jonas & Sons, received a copy of the plans and specifications, I think that a description of these cottages will not be out of place.

They are two-storied cottages built in pairs, and comprise living room, kitchen, washhouse, and three bedrooms. The living room, 12 ft. × 11 ft. is entered from a lobby, which also leads to the stairs. There are a mantel register and a cupboard. The kitchen, 12 ft. × 11 ft., has a self-setting range and a cupboard, but no sink. The pantry leads from the kitchen. There is no bath. The wash-houses are ingeniously arranged one behind the other at the rear, as also the fuel store and earth-closet, the last named being to the rear of all, and some distance from the back door. There are a copper and a sink in the wash-house. Access from the kitchen to the bedrooms can only be had by going through the living room. There are one large bedroom and two small ones, the latter without fireplaces. The windows to the small bedrooms are rather small. The ground-floor rooms are 8 ft. high, and the bedrooms 9 ft. to the ceiling, and 6 ft. 3 in. to springing of roof. The external walls are of 9 in. brickwork, and the roofs are slated. The roof is a single span one without dormers. The floors of kitchen, wash-house and pantry are paved with 6 in. square red tiles on 3 in. concrete; the fuel store and earth-closet with white bricks on edge in sand. The living room has a deal floor on 4 in. × 2½ in. joists

on 4 in. × 4 in. oak sleepers. There does not appear to be a layer of concrete under this, and in this respect the requirements of even the Model Rural By-laws would not be satisfied. The interior finishings are all good and suitable. The staircase has a handrail, and is properly lighted. The fireplaces and chimneys are grouped together in the centre of the pair of cottages. There is a pent roof over the entrance door. These cottages may be described as exceedingly good and cheap. The area of the pair is 1,060 sq. feet. The erection of these cottages, 43 in all, has been spread over twenty-four years, the last pair having been built in 1897. It is interesting to note that the later cottages were cheaper than the earlier ones, the last pair costing only £288. This includes contractor's profit, which the Letchworth cottages do not. As the cubical contents are 18,560 sq. feet, this works out at 3·13d. per foot cube.

A careful examination of the exhibits in Class 1 and 2 suggests a few reflections.

In the first place, no striking novelty in construction has been produced. With the exception of a few cottages, which have their external walls of concrete of thicknesses varying from 7 in. to 10 in., there are practically no suggestions of any real value as regards new materials or construction for external walls, and thus we have only a choice between brickwork and concrete. External walls of open timber framing, or of thin plaster or concrete slabs, are quite out of the question in this climate. It is plausibly said that many of the old cottages were of wood and were very comfortable. No doubt they were. The windows were very small, seldom open, and there was no attempt at ventilation. Nowadays, circumstances are very different. The windows are larger, ventilation has to be considered, and a cottage with thin external walls of whatever material could not be kept comfortable (*i.e.* warm) in winter without a great expenditure of fuel. As to durability, it must be obvious that walls of timber framing or very thin slabs of plaster or concrete cannot be considered permanent in the true sense of the word; nor the class of construction upon which money could be borrowed. Again, the cost of repair must be considered. Cottages built of slight and perishable materials will cost a serious amount per annum for their upkeep. As to fire, some of the timber cottages in the Exhibition are mere tinder boxes. There is only one external wall in the Exhibition, other than of brick or concrete, which deserves consideration, and that is to the pair of cottages by Messrs. Potter & Co. (No. 35). This consists of steel framing (3 in. × 3 in. steel joists) with steel lathing on both sides, covered with rough-cast externally, and plastered internally,

leaving an internal air space of about 4 inches. This, however, cannot be equal to a 9 in. brick wall, and would not be much cheaper.

We thus get back to either the brick or concrete wall. In those districts where good ballast can be obtained on the site, it is possible that a 9 in. concrete wall would be slightly cheaper than a 9 in. brick wall, but it is very doubtful whether the small economy would outweigh the undeniable advantages of brickwork. We apparently come, then, to the conclusion that, all things considered, a brick wall is most suitable for these cottages. The thickness must not be less than 9 inches, and an 11 in. hollow brick wall is preferable (No. 69, which has taken the prize for the cheapest cottage, has this). In any case the brickwork should be covered with rough-cast, as an additional protection against the weather. This external covering is even more necessary for a concrete wall.

It may be convenient to give a short description of some of the special constructions of the external walls other than brick or ordinary timber framing.

No. 25. Brick-nogging, rough-cast.
35. (Single.) Concrete 7 in. thick, rough-cast.
35. (Pair.) Steel construction 3 in. by 3 in. with steel lathing on sides, covered externally with rough-cast, air space internally.
36. Solid oak posts with 3 in. compressed cement concrete slabs filled in between (into grooves).
38. 10 in. by 8 in. hollow concrete blocks finished externally in imitation of stone.
40. Brick-on-edge, reinforced with ironwork as patented by the Fire-proof Partition and Spandril Wall Company, with rough-cast externally.
47. Timber framing, expanded metal lathing, and Portland cement rendering.
48*a*. "Mack" slabs 4 in. thick, covered with rough-cast.
50. 6-in. timber framing pugged and covered with rough-cast.
53. 4-in. timber framing covered with "Uralite" Kent board.
58. Concrete blocks, 32 in. by 9 in. by 10 in. finished externally in imitation of stone.
59. Concrete 7 in. thick.
69*a*. 6-in. concrete cast slabs slightly reinforced with steel.
72. 1-in. weather boards, one layer of inodorous felt, and asbestos cement sheeting $\frac{1}{4}$ in. thick.
73. Two 2-in. concrete slabs with an air space between.

77. Overlapping vertical boards, 8 in. by 1¼ in., interlined with ferol sheeting, and lined with matchboarding covered with Cannon and Hall's distemper.
80. 4-in. timber framing covered with insulating paper and weather boarding.
85. 6-in. concrete and timber.

The all-important question, however, and the one which it was the object of this Exhibition to solve, is that of cost. Can a cottage of the type of No. 14 (prize winner) be built for a prime cost of £150? Here again the question of locality comes in. At Letchworth, as will be seen by the schedule below, building materials appear to be very cheap, especially bricks, and this, no doubt, accounted for the fact that the Judges report that they are satisfied that this cottage has actually been erected for the stipulated amount, which in this case works out at 3½d. per foot cube, the cubical contents being 10,272. This is a low price even under favourable circumstances, but it is higher than the cost per foot cube of the most recently built of Lord Carrington's cottages; so that there is some reason for believing that it is possible to erect a cottage, or at all events a pair of cottages, for something near the stipulated amount. The information which Lord Carrington has made public with reference to the actual cost of his cottages, under the conditions of ordinary contract working, is certainly most encouraging.

SCHEDULE OF PRICES OF MATERIALS AND LABOUR AT LETCHWORTH.

		Delivered on site.		
Fletton bricks	per thousand	£1	4	0
Sifted sand	per load	0	4	0
Local red tiles, sand-faced...	per thousand	1	11	6
9-in. red tile quarries ...	per thousand	3	5	0
Wages—				
Bricklayers	8d. to 8½d. per hour.			
Carpenters	8d. to 8½d. do.			
Masons	9½d. do.			
Plasterers	9d. do.			
Painters	6d. to 6½d. do.			
Labourers	4½d., 5d., & 5½d. do.			

AS TO BY-LAWS.

The cottages at Letchworth have been built under the Rural By-laws of Hitchin. These are practically the Model Rural By-laws of the Local

a man could reach, for his own view was that it would be a greater advantage to give the extra brickwork in a larger area. Another important thing was that they had asked the originator of the exhibition to get the contract bills of quantity for the cottages so that they could know what was the minimum amount of materials required to get the greatest amount of cubic space, and so give them a guide to the use of the cheapest material.

Miss C. Cochrane (St. Neots) gave a short account of what the agricultural labourers and their wives had themselves told her of their needs in regard to cottage accommodation. Three bedrooms, a large kitchen living-room, a small parlour, a large larder facing north or east were universally asked for. A larger cottage was needed in the country where the winter evenings had to be spent indoors, than in the towns where there are many attractions away from the home. The majority of village people would be satisfied to have the copper in the shed outside the cottage, some sort of shed being a necessity in a rural district. There should also be a small fireplace in the shed for cooking in summer. Handrails to the stairs, one large window opening at the top, and good sized rooms of moderate height, were points all emphasized by the wives of the labourers. Miss Cochrane strongly advocated gardens of not less than a quarter of an acre, the provision of which would render all drainage unnecessary; and she also spoke of the very serious and urgent question of water supply as one which ought to be dealt with from a national point of view. There was very little demand for the modern bath, the wash tub being considered sufficient under existing conditions of scarce and distant water supply, which is seldom or never laid on in country villages. The way in which rain-water was now wasted was very wrong. The standard of healthy housing with sufficient accommodation should on no account be lowered. The people must be brought to value good homes, and employers, owners, and sanitary authorities should cultivate a higher sense of their responsibilities towards those dependent upon them.

Dr. Woodforde (M.O.H. for the Berks Combined District) said he would like to add one more to the requirements enumerated as essential for the labourer's cottage, viz., the need that it should be so planned as to economize as much as possible the labour required to keep it clean, healthy and in proper order, remembering that in most cases there would be only one pair of hands to do all the work besides discharging the domestic duties of wife and mother. He thought that the third room or parlour considered unnecessary by Mr. Aldwinckle was desired by most cottagers' wives, who liked to have a little best room to see their friends in and to use themselves in addition to the common working and living room of the family. He must say he was disappointed with the Letchworth exhibition. With a good deal that was interesting and suggestive there did not appear to be any satisfactory new departure in cheap and good cottage building. To the outside public the £150 condition of cost was very misleading, as so many

items were excluded which in cottage building elsewhere would have to be brought into the account, besides which, the bricks used cost at the outside only 24s. per 1,000: sand and gravel were on the spot, the subsoil was chalk beneath a very thin stratum of surface soil, so that foundations such as would be required in many other localities were not necessary, while the by-laws in force in the district were the rural ones, which left most structural conditions entirely to the builder's own choice. Yet with all this in their favour, when the designers were written to and asked if they were prepared to erect similar cottages in other districts for £150, with scarcely an exception they declined to do so, those who sent any replies at all to the application naming prices ranging between £165 and £239, also laying down conditions as to the price of materials and the requirements of by-laws in force in other places. Strangely, the cottage which took the first prize in Class I. was built almost in entire accordance with a good code of by-laws. In the speaker's own neighbourhood many pairs of substantial brick-built six-roomed cottages had been erected within the last few years in a district (Wokingham rural) where the by-laws were the complete original model code, and were carefully observed. Each room was 8 feet in height all over; the largest living room and bedroom had each an area of 13 feet 6 inches by 11 feet 6 inches, the cost being only £300 per pair, including drainage and water fittings; and the builder was prepared to put up similar cottages at the same price at the present time. As regarded depopulation in rural districts and its connection with the alleged hindrance to the building of proper cottages, caused by by-laws, which were so strongly urged by some persons, his own view was that it had little to do with the matter. The Berks district included not only the greater part of that county but also some areas in Oxfordshire, Surrey and Wilts. In the last named and in some of the other strictly rural parts of the combined district there were either no by-laws at all or only those of the rural code, which left "structural" conditions outside their scope; there was hardly any cottage building, but there was a great and continuous exodus of the labouring classes. In such districts wages were extremely low, and the hope of bettering themselves, often a fallacious one, appeared to be the moving cause, and not any difficulties put in the way of persons desiring to erect cottages by the by-laws, which in some places were non-existent, and in others put no restriction on structure. He quite admitted that by-laws for rural areas need not insist on certain requirements necessary for urban or semi-urban districts, and where a cottage was put on a piece of ground of not less than a quarter of an acre, he would, as an inducement to the landowner to give ample ground for garden purposes, for the disposal of refuse, and the safety of the water supply, be willing to forego most of the by-laws regulating structural materials, &c., but he considered good and suitable by-laws carefully administered to be absolutely essential, not for the coercion of landowners or conscientious cottage builders, but for the control of the mere speculator and of the jerry builder, whom unfortunately we still have with us.

Miss S. Gurney (Co-partnership Tenants' Housing Council) said a reference had been made to the rise of garden villages in connection with industrial undertakings in the country as being a separate matter from ordinary country housing. She would suggest that in developing such a garden village, the best method was to work through a co-partnership tenants' society. She mentioned that such a society was shortly to be started at Bournville. A co-partnership tenants' society was an association of persons desirous of developing a given piece of land in the interests of those who were to live there, limiting the return to capital. The tenants were shareholders, paying by small instalments, and outside capital was also used. The planning of a building area was as important as the planning of the individual houses, and with that such a society was, from its nature, well qualified to deal. The wish had been expressed by Miss Cochrane that these societies could deal with purely rural conditions, but so far it had been found easier to develop them in connection with the industrial classes. There were successful societies at Ealing, Garden City, and elsewhere. That at Garden City had built its first houses round a common green, and built the houses exhibited by the Co-partnership Tenants' Housing Council, which received a prize for a pair of cottages at £300 in the Cheap Cottage Exhibition. These societies built different types of cottages at varying rents, and aimed at bringing different classes, clerks, artisans, workmen, and others, together, while in ordinary modern suburban life the tendency was to the separation of the classes; they encouraged thrift and self-reliance in the tenant shareholders, and further acted as social centres, having football, cricket, tennis, and recreation clubs. In all these ways they tended to prevent the formation of the new slum, which was so apt to grow up in our poorer suburbs.

Mr. Charles J. Hair (Southampton) said in planning bedrooms the position of the bed should always be shown to scale: neglect of this often led to bedrooms being built in which it was impossible to put a bed without its being in a draught or being too near the fireplace. He approved of concrete construction and thought that concrete as a material was not yet fully appreciated; it was capable of bearing a very great weight for comparatively little thickness. The difficulty was that the present by-laws insisted on its being built a great deal too thick. The two great points in its favour were, incombustibility, and the fact that it could be made by practically unskilled labour. With regard to a remark made by Alderman Thompson about supplying the quantities in order to judge plans, he had some experience in judging plans, and he agreed that the only fair way was to reduce each item to a comparable unit; that is to say, that if the number of bricks were taken in each case it would be easy to see which plans cost the least in brickwork and this should be followed out with the other materials, as it was a very much more accurate method than pricing on the foot cube. With regard to by-laws: he had not found many serious difficulties, and most local authorities were inclined to give way where their by-laws were

proved to be too strict. By-laws were sometimes made the excuse for extravagant planning. He approved of the plan of the porch giving access to the living room on one side and the parlour on the other, and having the staircase in the middle of the house, as it was a plan which obviated the necessity of going through one room to reach another, both on the ground floor and also the upper floor.

MR. W. A. POWELL (London) said that it was impossible to build a detached cottage in a substantial manner, and in accordance with ordinary by-laws, from any of the plans on the walls that he had been able to examine, to include builder's profit, architect's fees, water supply and drainage, and to fence around the site for the sum of £150. These important items, he understood, were omitted from the requirements in the Garden City Competition. The cost of the building and enclosures must necessarily vary according to the locality being easily accessible, or otherwise, for cartage of materials, and upon the soil of the site; if clay, deeper trenches would be required and a good concrete foundation rendered necessary; if, on the other hand, the site is gravel or chalk, less digging and artificial foundations are needed, and the material excavated for the walls, &c., if found to be of good quality, could be used in the construction of the building, thus considerably reducing the first cost. Chalk had been used some hundreds of years ago, in the walls of cottages near chalk pits in Oxfordshire; these cottages have stood well, but so soon as the walls begin to decay the buildings soon collapse. He considered each cottage should be let with at least half-an-acre of garden ground, part of which might be within an easy distance of the cottage and not necessarily around it. In criticizing some of the plans exhibited, he objected chiefly to the joint entrance lobby, the staircase being entered direct from the parlour, and the bath in scullery, and recommended the observance of the following points in planning:—Angles in rooms should be as few as possible, both to insure cleanliness and to save cost. The smallest bedroom should be large enough and the door and window so arranged as not to necessitate the side of the bed touching the wall. Grouped angle fireplaces are preferable both for economy in building and the opportunity offered of warming the upper rooms by means of the kitchen flue. More plastering and woodwork than is absolutely necessary should be avoided. The ground floor should be solid, without any space beneath. It seemed a step in the right direction to obtain detail bills of quantities of some of the most approved competitive plans, so that estimates for the same planned cottage might be obtained for erection in various localities. The remedy for overcrowding in the large cities, and notably in London, seemed to be on the lines of the Garden City scheme; by inducing the manufacturers to remove their works into the country, and to provide good cottage accommodation around their factories for the employees, the manufacturer would economise in the reduction of the heavy rents, taxes and expenses

previously paid in the city, and have a healthier band of workmen, and the latter would be benefited by the saving of travelling expenses to and from work, and the time saved could be spent profitably in the garden under healthy conditions. This seems preferable to erecting thousands of artizans' houses in the suburbs of London by local authorities, with the inevitable rush of the workmen at the same hour of the morning to crowd the early trains and trams, taking them towards their city workshops and factories; it remains to be proved whether in forming new suburban colonies of workmen by the London County Council, the same faults that the originators of the Garden City are now trying to abolish, may not in years to come, be repeated. Council property would, no doubt, be well and substantially kept up, the owners being backed up by the rates, but how would the private owner of similar adjoining property be able to compete against such an authority? Is it not probable that the most undesirable class of tenants would gradually be moved out of the Council's houses, only to find shelter in those of private owners in the immediate neighbourhood, followed by overcrowding, decline in the condition of the premises and the lowering of the particular district?

Mr. F. W. Troup (London) thought it was no use Mr. Aldwinckle saying that timber-framed walls covered with plaster or wood were out of the question in this country, for they had both been used for centuries and there were plenty of examples extant which have stood for centuries; he preferred a solid wall and solid floors too for that matter, when they were possible, but it was doubtful if nine inches of brickwork were warmer than two sheathings of plaster with an air space between, and certainly the brick wall, even cemented, was not so dry. Brickwork did require repair and for that reason timber-framed walls, either plastered or boarded, came much closer into competition with *cheap brick*. Repairs were certainly needed to woodwork, but, if it was not neglected, they were cheaper and more easily effected than in brickwork. He admitted that plastered or boarded walls were less the materials for a *landlord* than for the *owner* who lived in his own cottage and the necessary repairs were done at once. In the latter case he doubted whether the timber-framed cottage had not as long a life as the brick one *built for the same money*. The large windows required for modern cottages under the clauses of the Public Health Act were a difficulty certainly. They made the rooms colder and more difficult to keep warm. But it must be remembered that in many of the old cottages with small windows the casements and glazing were both very open-jointed and allowed a deal of unintended ventilation; the same remark applied to doors and sometimes to roofs and floors, and certainly to the huge old ingle fireplaces. So that he feared the old cottages were also difficult to keep warm, though in a healthier way than from the big expanse of sheet glass in modern windows. As to fire, of course a timber-framed cottage would burn to the ground if set alight, but why set it alight. People do not lay fires up against a boarded partition any more

than they spread hot coals on a boarded floor. After all the best test of what was dangerous was the insurance companies. They might be trusted to take care of themselves, and when he gave a full description of his boarded and timber-framed cottage he was charged ordinary risks and paid ordinary premium. It was the chimney and the roof where the danger lay, and the most solidly built brick cottage would be charged double premium if it had a thatched roof. None the less, had he known that brick was to be quite as cheap as 16s. 6d. per 1,000 at Garden City he would, probably, have built his cottage in brick as Mr. Aldwinckle suggested, the builders' estimates being some £12 under the £150, and he *knew* that many others shared Mr. Aldwinckle's prejudice in favour of bricks. In Hampshire in a rural district with similar by-laws to Garden City, he had an opportunity of putting up the same kind of cottage, finished externally with steel lathing and cement rough cast in place of the weather boarding * and he was now repeating it in brick (rough cast) in a district where the ordinary by laws are in force (more stringent than Hitchin) and he should be interested to know what difference that would make in the cost of building. To sum up he agreed that, taking all aspects into consideration, a brick cottage if properly built was probably better than a wooden-framed one for the ordinary conditions under which cottages were used and inhabited in this country. But at the same time he did not think the last word had been said about these so-called temporary materials, as shown by the exhibits in the Cheap Cottage Exhibition. He was certain that if such a cottage as No. 80 were taken in hand by Mr. Clough and built by the methods he had adopted (buying his materials in large quantities and having the houses built by a builder trained by himself and working onwards from one improvement or economy to another) he was sure under these conditions that brick would not be able to *touch* timber in cost, whether covered with boarding or lath and plaster. The necessity for cheap houses was too great to overlook any method for obtaining them, and there were some parts of the country where the difference between brick and timber was much greater than in others. It was in such districts, and not generally, that timber had its opportunity; single cottages, of course, not rows or terraces, where he granted, fire became a much more serious menace. It was well known that in America, outside the larger towns, there was hardly anything but timber-framed houses. And this was even more true of Sweden and Norway. What was good enough for Sweden and Norway was surely good enough for our own milder climate. In making their awards at the exhibition, the judges did wisely, he thought, in separating the timber cottages from the others and giving separate prizes for that type of construction. They came under another category, but they had a purpose and possibility of their own which in *rural housing* deserved the most careful consideration.

* This cottage cost less than £150 complete, including profits.

Dr. Sykes (London) in reply said that he was analytical and critical with a view to arriving at generalisations and finding principles as guides to the construction of healthy cottages. There is a real and present danger of overlooking the well established fact that a flue is the only outlet for the ventilation of a bedroom, and that if there be a fireplace at the bottom of the flue so much the better. In planning, when the removal of the wash-house from the scullery to an out-house is designed, the kitchen is usually converted into a kitchen-scullery, by the removal of the scullery to the out-house the kitchen is converted into a kitchen-parlour, and by the further removal of the cooking range to the scullery the kitchen is converted into a parlour solely, at which point the stage is again reached of parlour, kitchen, and scullery-wash-house. This process may be pursued round and round in a circle. The management of the earth-closet is a matter of domestic sanitary education, and it tends to retard this education to assume in by-laws that an earth-closet will be kept in an insanitary condition. If it were assumed that tenants can be trained to elementary sanitary conditions, and they were compelled to conform to them, much more good would be done than by giving them opportunities to neglect them as present by-laws do. He was glad to hear that, in certain parts of Oxfordshire where chalk was used for cottage construction, the only fault to be found with the chalk was that it lasted for two or three hundred years, then crumbled away and fell down: he should think that such conditions would be ideal.

DISCUSSION ON WATER FILTRATION.

THE HEALTH ASPECT,
By A. SCARLYN WILSON, D.P.H.,
Medical Officer of Health, Hastings.

PRESSURE FILTERS,
By PHILIP H. PALMER, M.Inst.C.E.,
Borough and Water Engineer, Hastings.

THE CHEMICAL ASPECT,
By H. F. CHESHIRE, B.Sc., F.I.C.,
Public Analyst, Hastings.

At Sessional Meeting, Hastings, November 25th, 1905.

"THE HEALTH ASPECT." BY A. SCARLYN WILSON, D.P.H., *Medical Officer of Health, Hastings.*

HASTINGS is a clean and well-ordered town, equipped with the necessary means to meet the rather exacting demands of a first-class health and pleasure resort; yet from a sanitarian's standpoint, as regards anything that is particularly novel or noteworthy, there is not much that calls for special remark. For example our position on the open sea-board, with a powerful ebb and flow of tide, enables us to dispense with any elaborate system of sewage treatment. Again, Hastings was almost the first town to adopt what is now universally acknowledged to be the only satisfactory method of refuse-disposal, namely, destruction by fire; yet in the course of time our Destructor, while it admirably serves the ends for which it was designed, and in spite of alterations and additions which it has received, is no longer a pioneer amongst such apparatus. Our isolation hospital, though we regard it with pardonable pride, resembles in most of its details many other institutions of similar nature. We have nothing notable to show in the way of vast factories or dangerous trades; neither improvement areas nor municipal dwellings; neither public abattoir nor crematorium, which might offer themes for useful discussion and interchange of ideas. Eventually it was thought that our new waterworks at Brede might prove some attraction to you, and that in

when we have to deal with water to which sewage gains, or may gain, access. In this case a far more thorough filtration is needed in order to remove the disease-producing organisms with which it, the water, may be charged. The method adopted to accomplish this purpose is, briefly, an attempt to imitate, or reproduce artificially, the process of purification which water undergoes in its passage underground through considerable thicknesses of pervious strata; it being recognised that the water yielded by deep springs and wells is often almost sterile and of the highest degree of organic purity. The filter-beds by which this process is effected consist almost invariably in this country of fine sand disposed in layers of considerable thickness, through which the water percolates at a low rate of speed. The method of construction and employment of these sand filters has been carefully studied by Koch and others, and I will not take up your time with further details on these points. I may, however, remind you that the most effective agency in the removal of bacteria is not the sand, but the slimy or colloidal deposit which forms upon the surface of the sand. It is on the integrity of this layer that the efficiency of the filtration in the main depends.

As to the degree of purification likely to be effected by sand filtration, it was shown many years ago by Dr. Percy Frankland that the living organisms in unfiltered Thames water could thereby be reduced from 3,000 to only two or three in a drop; while in the elaborate experiments carried out by the Massachusetts State Board of Health in 1891 it was proved that substantially all the disease-producing germs could be removed by a very careful sand filtration conducted with proper precautions; and if the required conditions can on the large scale be complied with and continuously maintained, the danger from polluted supplies could, as it would seem, scarcely be said to exist.

Viewed from the practical standpoint it can hardly be doubted but that the filtration undergone by the Thames water has sufficed to protect London from any epidemic of typhoid fever, though it may possibly be the fact, notwithstanding, that individual cases of the disease in question have arisen from infection contracted through drinking the water; but, unquestionably, such cases if they do occur must be few in number.

As a second example, mention may be made of Lawrence City, where, in the six years preceding the construction of the city filter, the death-rate from typhoid was 11·92 per 10,000; which was reduced in the five years following its construction to 2·82 per 10,000.

Again, the more careful filtration of the Elbe water carried out in

that city, undoubtedly saved Altona from an outbreak of cholera in 1892, at the time when her neighbour, Hamburg, passed through a severe epidemic of the disease; 18,000 persons being attacked in three months, with 8,000 deaths.

Yet there may be a failure to maintain the filtration in the required standard of efficiency as the result of laxity or other circumstances, some of which may be beyond human control, and should the water to be filtered then contain the specific organisms of disease, disastrous consequences may ensue.

For example, the most serious typhoid outbreak of the current year in England appears to have originated in the city of Lincoln in the following circumstances. The city is supplied with water drawn from the river Witham and its tributaries. This river (unlike the Thames, which is largely fed by numerous underground springs of wholesome water) consists of little more than the surface drainage of a cultivated alluvial district, reinforced by the sewage discharged from the various towns lying within the watershed area. It is patently and notoriously contaminated, and has been condemned time and again by the health authorities. Yet for years the water drawn from so questionable a source was, after filtration, consumed with comparative impunity by the people of Lincoln. But at the end of last year during a period of frost, when many householders kept the taps running to prevent the water from freezing in the pipes, there was a sudden increase in the quantity of water required. To meet this demand, so it has been stated, the rapidity of filtration was increased, and with fatal results; for the water, polluted no doubt at the time with the specific germ which the overtaxed filter-beds failed to remove, immediately gave rise to an outbreak of typhoid fever, no less than 547 cases occurring in the first three weeks of the epidemic among a population of 50,000.

Again, at Altona an inquiry was held into the conditions under which, early in 1892, an outbreak of typhoid occurred, and the suspicion arose that frost had impaired the integrity of the filtering surface; while it was shown later that in the following spring freezing of the sand layer at the top, during the process of cleansing, was followed by an outburst of cholera in the city. In this case the regular bacteriological examinations of the filtered water, which were carried out at frequent intervals at Altona, revealed the partial failure of the filtration process, a great rise in the number of bacteria present in the filtrate having been observed on each of these occasions preceding the date of the outbreaks. It is

evident, therefore, that sand filtration of polluted waters, even when most carefully conducted, does not in practice remove all danger of ill results following, though the risk be reduced to a minimum thereby.

Let then no false sense of security, bred of over-reliance in the permanent efficacy of any system of filtration, induce us to abandon any available means of protecting from pollution the sources of our water supplies; nor let us forego or let slip any opportunity of substituting for a tainted an unpolluted water-service. Let the filtration of any water liable to sewage contamination be consistently carried out with the same care as if the water were known to be specifically polluted.

Let such filtration be carried out under the supervision of the sanitary authority whether the waterworks be a municipal undertaking or a private concern, seeing that on the sanitary authority is laid the responsibility for the health of its district, and that to have responsibility devoid of full power and control is neither fair nor just.

"PRESSURE FILTERS." BY PHILIP H. PALMER, M.INST.C.E., *President British Association of Waterworks Engineers; Borough and Water Engineer, Hastings.*

THE rapid development and extension of water works in every civilised country during the past forty years is a matter which deserves most careful consideration, as there is hardly a subject which more directly affects the health and well-being of the general body of inhabitants of all cities and communities.

Year by year the question of supplying towns and villages with an efficient and ample supply of good water has been growing more prominent, until now, in this country at all events, the matter is looked upon as one of the first importance and necessity.

England has secured a whole series of magnificent supplies by impounding the waters of streams, in reservoirs holding enough water to last through dry periods, while in Continental Europe such supplies are comparatively rare. Germany has spent millions in purifying turbid and more or less polluted river waters, while France and Austria have striven for mountain spring waters, and have constructed hundreds of miles of costly aqueducts to secure them. In the United States the use of river water is very general, some of the streams being polluted to a considerable

degree, and in India there are to be found some of the finest modern examples of impounding reservoirs.

The importance of a good and pure water supply has brought the subject of filtration very much to the front, and it is now almost universally admitted that the majority of waters should be filtered to free them from mineral or organic matters in solution and suspension.

Filtration of water consists in passing it through some substance which retains or removes some of its impurities; in its simplest form filtration is a straining process, and the results obtained depend upon the fineness of the filtering material, and are also regulated by the character of the water.

The general construction and working of open and covered continuous and intermittent filters in which sand is the filtering medium are known to most people having to deal with matters connected with Sanitary Science, and in this country their working is not materially disturbed by climatic changes and extreme turbidity of the water, and they are worked under rules which are now generally recognized as to the depth of the sand, rate of filtration per acre, size of the grains of sand, duration of working, cleansing, etc.

In this paper it is the author's desire to offer a few remarks and give a brief description of some of the mechanical filters which are comparatively little known in this country in connection with domestic supplies, and which he thinks might be used extensively for the complete filtration of water.

The term, mechanical filters, is used to designate a general class of filters differing in many respects from the sand filter. They had their origin in the United States, and consisted originally of iron or wooden cylinders filled with sand through which the water was forced at rates greatly in excess of the rates usually employed with sand filters. Improvements have been made from time to time and their use extended, so that at the present time they are used in many cases with most satisfactory results.

The two types of mechanical filters in common use in the United States are the Warren and Jewell filters, which are very similar in design and consist of a circular tank or vessel containing a layer or layers of sand several feet in thickness; the raw water is admitted at the top of the filter, the filtered water being discharged at the bottom. They are cleansed by a reverse current of water, the filtering material being stirred by a mechanical rake until the cleansing process is complete. The filter is then left to drain before being again put to work.

The filters which have been used in this country are the "Reeves," the "Halliday," the "Jewell," the "Bell," and the "Candy," automatic, compressed-air, and oxidising filters. The two former are somewhat similar, and consist of iron cylinders with raw water inlet at the top and filtered water outlet at the bottom; they are fitted with stirrers for agitating the filtering material during the process of cleansing, the filtering material being sand. The Candy filter consists of an iron cylinder divided horizontally by means of perforated trays into three or more divisions; the space between the perforated plates is packed with a highly porous magnetic oxide of iron which forms the filtering medium. The magnetic oxide of iron varies in size from coarse grains to fine, the quality of the raw water determining the use of fine or coarse material. This filter is not fitted with a stirrer, the action of filtering and cleansing being performed much in the same manner as other mechanical filters. In America it is usual for the water to be treated with a coagulant (generally sulphate of alumina) before being filtered, but in this country the raw water is generally passed direct from the reservoir or source of supply to the filter, and only in a few cases are sedimentation tanks used.

The use of mechanical or pressure filters must depend upon the nature of the raw water; and where the impurity is principally owing to mineral matter either in suspension or solution they have many advantages over open sand filter beds.

The results obtained with water from deep wells at the Hastings Waterworks by passing it through pressure filters have been eminently satisfactory, the water having been deprived of all the free and albuminoid ammonia and as much as 96 per cent of iron.

The following is a report upon the Hastings water, before and after filtration through Candy pressure filters:—

January 12th, 1904.

HASTINGS CORPORATION WATERWORKS.

Result of Filtration by the Patent Oxidising Filter System.

Report on two samples of water collected by myself at the West Hill, St. Leonards, Filtering Station.

Sample No. 1, Crude or Unfiltered Water.

The water as received at the works is turbid, and after long standing precipitates one grain per gallon of solid matter, which on examination is found to be nearly pure oxide of iron, which was originally held in solution.

Expressed in parts per 100,000, I find the free ammonia ·011, and the albuminoid ammonia ·003.

Sample No. 2, Filtered Water.

This water is now colourless and yields no deposit on standing. The water is of a very high degree of organic purity, and is well adapted for drinking and domestic uses generally. The filtration system has oxidised and removed practically all the iron in solution and in suspension.

Chemical analysis shows it to be free from poisonous metals, and the free and the albuminoid ammonias have been entirely removed.

(Signed) Arthur Angell, Ph.D., F.I.C.,
Public Analyst.

I also give analyses of various samples from other sources before and after filtration through oxidising filters.

ANALYSES OF RIVER WATER FROM A STREAM FLOWING FROM PEATY MOORLANDS BEFORE AND AFTER FILTRATION THROUGH THE CANDY PATENT COMPRESSED AIR AND OXIDISING FILTER.

	Water before filtration.	Water after filtration.
	Grains per gallon.	
Total solid matter dried at 180° C.	4·8	4·8
Chlorine	1·0	1·0
Equivalent to chlorides (60 Cl.)	1·6	1·6
Nitric nitrogen	·046	·052
Equivalent to nitrates (17 per cent. N.) ..	·276	·312
Nitrites	absent.	
Hardness: Total	1·5°	2·0°
Lead, copper, zinc, iron	absent.	
Free ammonia	·00168	·00126
Organic ammonia	·00686	·00322
Oxygen absorbed at 98° F. in three hours ..	·1170	·0840

The analyst further reported that the filtering process had removed over 85 per cent. of the bacteria and 50 per cent. of the organic matter.

ANALYSES OF WATER FROM MOORLAND AND PEATY GATHERING GROUNDS BEFORE AND AFTER FILTRATION BY THE CANDY PATENT COMPRESSED AIR AND OXIDISING FILTER.

	Water before filtration	Water after filtration.
	Grains per gallon.	
Total solid matter dried at 180° C.	6·3	6·4
Chlorine	1·3	1·3
Equivalent to chlorides (60 per cent. Cl.) ..	2·1	2·1
Nitric nitrogen	·035	·035
Equivalent to nitrates (17 per cent. N.) ..	·210	·210
Nitrites	absent.	
Hardness—permanent 2; temporary 2: Total	4 degrees.	
Lead, copper, zinc, iron..	absent.	
Free ammonia	·0014	·0000
Organic ammonia	·0091	·0032
Oxygen absorbed at 80° F. in three hours ..	·0448	·0359

Of these waters the analyst reported that the unfiltered water is "objectionable on account of the somewhat excessive amount of organic matter which it contains. The filtered water, on the other hand, contains so little organic matter as to be classed with waters of very high organic purity."

Analysis of and Report on a Sample of Water. Description of Sample.

Leighton Buzzard District Council Water Supply after Filtration by the Patent Oxidising System.

PHYSICAL PROPERTIES.

Colour at a depth of two feet..	Colourless.
Smell when heated	None.
Appearance of residue after evaporation	White.
Turbidity	None.
Suspended matter	None.

CHEMICAL ANALYSIS.

	Expressed in Grs. per Gallon.
Free ammonia	·0138
Albuminoid ammonia	trace.
Oxygen absorbed in 15 minutes at 80° F.	none.
Do. do. 4 hours do	·0227
Nitrogen present as Nitrates and Nitrites	·0667
Chlorine (X 1·648 = common salt)	1·16
Phosphoric Acid	trace.
Poisonous metals (lead or copper)	none.

Hardness by Clark's Scale.

Total hardness, 14°; fixed, 3°; removable by boiling, 11°

REPORT.

As regards the removal of the iron naturally present in this water it is simply perfect. The water, for sentimental reasons if for no other, is unusable in its crude state, but forms an excellent water for public supply when the iron is extracted.

The crude water contains a large quantity of dissolved iron, the amount being 2·464, or nearly 2½ grains per gallon.

The iron has been practically all removed by the filtration system.

(Signed) ARTHUR ANGELL,
Public Analyst.

THE RESULT OF 18 BACTERIOLOGICAL INVESTIGATIONS.

Water on Rising Main from pump before filtration. *Number of colonies per cc. after 72 hours' incubation.*	Water after filtration through battery of Candy filters. *Number of colonies per cc. after 72 hours' incubation.*
95	14
154	10
81	18
44	9
80	14
505	19
245	27
326	17
158	20
224	9
124	10
189	9
531	22
113	28
267	22
143	19
116	10
153	12

The results of these eighteen bacteriological investigations show that no less than 91⅔ per cent. of the bacteria have been removed by filtration, a result most thoroughly satisfactory.—August, 1905.

The Hastings Corporation have installed two large batteries of the Candy filters, one at West Hill, St. Leonards, at an altitude of 145 feet above O. D. consisting of six filters, each 8 feet in height and 6 feet 6 inches in diameter, worked in pairs, the supply being taken direct from the 12 inch main from the Filsham Pumping Station and wells situated at a distance of two miles from the filters. The engine-house floor level is at an altitude of 32 feet above O. D., the wells being about 90 feet deep; and the whole plant is capable of filtering 40,000 gallons per hour.

In connection with the new works at Brede, four Candy filters have been installed at the pumping station, each of these 10 feet high and 15 feet in diameter, and capable of filtering 65,000 gallons per hour.

The rate of filtering is very largely in excess of that generally allowed for open sand beds, and what would be allowable if the water dealt with was bacteriologically impure; there is, however, no doubt that water impure from that standpoint can be successfully dealt with at rates of filtration much in excess of those allowed for open sand filters, and could in many cases be used with perfect safety and with excellent results where

open filters are now used, thus saving large expenses in first cost, and areas of valuable land.

The author is aware that mechanical or pressure filters are looked upon by many engineers and medical men as being strainers of suspended matter only, but he thinks this is a wrong opinion, as no doubt a properly constructed filter does actually remove organisms as well as iron in solution.

The fact that Hastings has fewer cases of enteric fever a year than any other of the twenty-eight large towns of England is, the author thinks, largely due to the care taken by means of efficient filtration to give a pure supply of water to its inhabitants.

THE CHEMICAL ASPECT, BY H. F. CHESHIRE, B.Sc., F.I.C., *Public Analyst, Hastings.*

I HAVE been asked to briefly open the discussion on "Filtration of Water" from the chemical side, that is in reference to its changes in composition during the process, so I will try to offer you some suggestive remarks rather than attempt to deal fully with any particular point; also not being acquainted with the treatment of the local water supply, these remarks will be quite general.

Filtration divides itself into natural and artificial, the former is able to teach us many lessons, though your interest will be mostly in the latter, the object of which is to improve the water by changing its composition.

Rain falls, and washing dust and microbes of all kinds out of the air, becomes unfit for drinking purposes as it may contain matters of the most objectionable or dangerous character, but filtering through the ground it leaves behind its solid particles, and probably becomes fit, though it has picked up various soluble materials from the beds it has passed through.

Thus the primary effect of filtration is to remove insoluble particles rendering the water bright, but it may pick up soluble matter from the filtering material.

Drinking water then still contains a certain amount of dissolved matter, being anything up to say 1 in 2,000. These impurities, or may we say dietetically "accompaniments," are harmless or injurious as the case may be, and the change in such by the process of filtration is not obvious if not absolutely nil.

The soluble accompaniments fall emphatically into two groups, organic and mineral; very minute quantities of the former, especially that of animal origin, become a serious, if not a fatal drawback to the good name

of the water, but it is these organic substances which are the most liable to be affected by filtration. They are generally unstable, and may pass chiefly by oxidation or deoxidation through various changes, even across into the perfectly innocuous mineral class as carbonic acid, water and ammonia, or nitrates. In any case the general tendency of filtration is towards simplicity.

The presence of organic matter is objectionable from two chief causes, 1) as an indication of a tainted source of the water or of part of it, and (2) that it encourages the growth of microbes and so may give rise to mischief or emphasise trouble, and perhaps will render the water unsightly in consequence, and this consideration is not after all an unimportant point, especially to the practical man. The simplification of composition brought about by filtering does not entirely remove this quality as the mineralised residues (particularly the nitrates and ammonia which may be looked upon as organic sign-posts), are still capable of supporting organic life. It does encourage, however, the harmless germs, and discourage those that may be mischievous, not only by removing the more complex materials they usually require for food, but by entering them in competition with their more vigorous brethren. It should be borne in mind that whilst the organic matter is stored up in the bodies of the living microbes it is practically removed from the water, also that some of these living forms are so small that our ordinary filtration may easily fail to remove them.

On the other hand complications may be brought about by filtration especially if the filtering material is allowed to get foul, and of course the free microbes themselves produce in their own substance organic materials and pave the way for other species to follow.

Where free oxygen is not available in sufficient quantity and much oxidisable matter is present we get more or less deoxidation, especially of certain mineral substances, as in the case of nitrates, which are converted into ammonia, or even the unstable sulphates deprived of their oxygen to form sulphides, as in the well known hepatic waters.

It will be seen that these chemical changes, though perhaps somewhat subtle, have a most important bearing on the dietetic value of a water. When you oxidise and simplify the organic matter thoroughly, you render the water much safer but sometimes render it more liable to subsequent change.

Oxidation may be favoured by the presence of certain substances, oxidation by influence we may call it; carbon is a good example of this, but it is particularly necessary to keep it clean and well supplied with

oxygen, manganese and iron compounds also, but if oxygen is deficient these are liable to go into solution from the filter beds.

In solution they act even more powerfully and themselves separate from the water if sufficient oxidation takes place. When an iron water is exposed to light we often see floating masses of separated iron oxide, and if we examine these we shall generally find that they consist of a delicate plant network perhaps of oscillatoria entangling the iron. The iron then being no longer in solution is removable by filtration as also the organic matter in the substance of the plant and with it the liability to further change. Purifying organic growths bring about the separation of iron and the presence of iron encourages the growth.

Light is a known enemy to injurious microbes and considerably encourages oxidation as the housewife finds when the sun shines on her coloured upholstery. It is also necessary to all green plants and many of these live in the water, some of them being most minute. These little green (or brown) plants grow at the expense of the carbonic acid and other mineralised residues and give off free oxygen to burn up the soluble and treacherous organic substances. They may also throw out carbonate of lime, etc., by taking up the carbonic acid in which it was dissolved.

But our filter beds must be kept clean and have an occasional rest in imitation of the natural ones. In nature rain runs through, but not continuously: when it has ceased raining the water continues its journey downwards drawing the air after it to reoxidise and purify the beds; so we must do in practice. If we keep the beds at work too continuously, even if they do not get choked up with insoluble matters, microbes grow there, multiply and die, setting the complex food free for other forms to use; the available oxygen gets rapidly used up and by its deficiency favours our enemies at the expense of our friends.

Gases as we have seen may be added or removed also by filtration, this will alter the flavour and character of the water considerably, as the presence of even the small quantity of carbonic acid usually found is an important factor of its palatability.

Briefly then filtration removes the insoluble matters but leaves the soluble ones, though these may be considerably modified, generally by oxidation, which is encouraged by light and certain substances. Ammonias and nitrates are residues of the oxidation of nitrogenous matters and are interchangeable. The tendency of filtration, though not often considerable, is in general towards improvement in quality and indications.

MR. ALEXANDER G. R. FOULERTON (East Sussex County Council) said that the question of the filtration of a water supply presented itself to the medical officer of health under two aspects. Filtration might be necessary in order to render a water supply of doubtful purity reasonably safe—so far as pathogenic bacteria are concerned. Or, filtration might be advisable in the case of a supply which was perfectly safe from the bacteriological point of view, in order to so alter the chemical composition of the water that it might be rendered more palatable, or otherwise better suited to the needs of the community. Or, again, in the combined precipitation and filtration of chalk waters by the Porter-Clark process, there was not only improvement of the water from the chemical point of view, but there was also the removal of a very large majority of the bacteria present, a matter which might be of great consideration when the boring in the chalk was in dangerous proximity to inhabited areas with the risk of direct pollution through fissures of the stratum. Filtration was, of course, necessary when a public supply was taken from a river; and he thought that they would all agree that a river was the least desirable source of supply for a town to have to depend on. For practical purposes he thought that they might say that there was no river in England which could supply a water fit for a large town supply without filtration. And sand filtration was bound to break down from time to time. The Lincoln outbreak was only one of a series of cases in which sand filtration had failed to afford security. With regard to the London supply derived from the river, it was believed that the sand filtration was not continuously efficient: but the influence of the water supply on the prevalence of typhoid fever in the metropolitan area was a matter as to which they had no exact information. At any rate he was not one of those who looked upon the Thames as a desirable source of supply. However much pure spring water the river received in its course, it also collected a very large volume of sewage effluents, and he altogether doubted whether its constant use was unattended by a certain degree of danger. So far as the County of Sussex was concerned, their public water supplies were almost invariably derived from sources which were absolutely secured from the possibility of dangerous pollution, and so the question of bacterial purification by filtration had only an academic interest for them. But still he must confess that he would like to see, if not the Porter-Clark process, at least the simple precipitation process applied to the water supplied to the county from the South Down chalk. The only water supplied to the county which had been softened, was that supplied to a part of the East Grinstead Rural District by the East Surrey Water Company after undergoing the Clark process at the works at Kenley and Purley, with the result that at the former works the total hardness was reduced to 41 parts per million, and at the latter to 45 parts per million. Side by side with the economic advantages of the softening of the water, there was a large reduction of the number of bacteria present in it—a reduction which might amount to 95 per cent. when the water was treated by simple subsidence without filtration. It was probable that the

Porter-Clark process in its entirety was not practicable in the case of large supplies; but since in at least one case water was supplied in the county from a well which was closely situate to possible sources of pollution, he would like to have, at any rate, the security afforded by the simple subsidence of the Clark process, quite apart from the economical advantage which would apply in the case of all the supplies which were derived from the chalk. Then there was the question of the filtration processses for chemical improvement of iron-containing waters by the removal of the metal. Many of the public supplies of the county were derived from iron-bearing strata of the Hastings beds, and so the matter was one of present importance. The system of mechanical filtration had been employed in the county only at the Hastings Corporation's works: all the other public supplies in the county were freed from iron, when necessary, by aëration and sand filtration. All these iron-containing waters were naturally of excellent purity. Filtration was resorted to only for the purpose of removing the iron, and the question as to the relative advantages of mechanical filters and sand filter beds had to be considered: firstly, as to the efficiency with which the removal of the iron was effected, and, secondly, as to the cost. As to efficiency, with regard to the object in view, he did not think there was much to choose between the two systems. By sand filtration, when the filter beds were working well, all but a negligible trace of the iron was removed. Thus at the works of the Crowborough Water Company near Rotherfield, the iron was reduced from 1·2 parts per million to ·1 per million; and in the case of the Balcombe works of the Cuckfield Rural District Council, the iron was reduced from 3·8 parts per million to ·2 per million by sand filtration. Equally good results could be obtained by thorough aëration and subsequent rest in a subsidence tank, by which means the iron in a water containing 11·8 parts per million, was reduced to ·2 per million in a private installation in the Uckfield district. But this process probably would not be suitable in the case of large public supplies. On the other hand, when they came to the question of expense, he thought that the advantage was altogether with the system of mechanical filters. The initial cost of the mechanical filters might compare favourably or unfavourably with the cost of sand filter beds, according to the price of land and other circumstances. But he thought that the cost of maintenance with the mechanical filters must always be considerably less than with the sand filter beds, which required constant attention, with consequent expense in the way of wages. He thought that the Hastings Corporation were to be congratulated on the successful working of their water undertaking; and he felt sure that those present at the meeting were very grateful for the most valuable papers which had been contributed by the executive staff of the Borough Sanitary Authority.

Dr. S. Rideal (London) hoped that whatever the politics of members, they were all out-and-out protectionists so far as water supply was concerned. At the same time he ventured to think that when one came to examine closely

into the bacterial "duty" of the two rival methods of water filtration they would find that neither process could be relied upon as certain in shutting off the introduction of the foreign pathogenic organisms into the domestic supply. The example we had recently at Lincoln showed how dangerous it was to rely upon English sand filters in winter time to give good results when improperly controlled, and the American pressure or mechanical filters, likewise, if neglected or worked at too great a speed or with too little coagulant would likewise at times break down. The health aspect of the problem, therefore resolved itself into this: was it not better to ensure the absolute sterility of the water actually used for drinking than to rely on filters of either class which never gave a perfectly pure water, and which might, at times, deliver a dangerous one? The old standard of less than 100 organisms per c.c. was, of course, absurd; as amongst the 100 might be the very dangerous ones which ought to be excluded. He had on previous occasions argued that the 30 or 40 gallons per head in England and the 200 gallons per head in America were used mainly for flushing water-closets, and streets, and for fire hydrants, and that it mattered little whether such water contained 1 or 100 organisms per cubic centimetre. In 1903 Dr. Hamer, in an inquiry on behalf of the London County Council as to the consumption and purity of aerated waters in London, estimated the amount drunk per head of the population as 5 ounces out of the total physiological 3 pints or 3½ pints per head, whilst the amount of cold water actually drunk per head he considered was only ½-pint, or as a maximum ¾-pint per head per day. In other words, to supply London with sterilised *drinking water* in bottles would only involve doubling or trebling the present aerated water bottling trade of the metropolis. Dr. Rideal did not, however, think this suggestion was the way in which the problem would be solved, but rather by installing, as a part of each household, fittings which would insure sterility of the existing supply. Pasteur-Chamberland filters and heat sterilisers were both capable of being used in this way with absolutely reliable results if under proper municipal control and adequate safeguards. In comparing mechanical filters with ordinary sand filtration he believed that the former possessed the advantages of economy in construction, control in working, and when fitted with steam, of ease in sterilising in the event of a breakdown. Hastings was fortunate in having a water supply, derived from the Ashdown Beds, which was reasonably free from the dangers of pollution, but the advantages derived from treatment by the pressure filters at Brede were obvious from the samples exhibited. Not only was it more economical to use such filters for removing suspended matter from turbid waters, but after aeration the iron in solution, as in this case, could easily be separated, thus preventing any subsequent deposition in the pipes and discoloured water in hot-water systems and baths. The advantages of the American filter seemed to be greater in countries where the winter temperature was severer than in England, as the open sand filter used in this country was liable to freeze without protection. Dr. Rideal also pointed out the desirability

of using mechanical filters in connection with the lime processes for softening water and also for hardening waters which had plumbo-solvent properties, when the moorland colouring matter would be at the same time removed.

DR. HUGH STOTT, (Combined Sanitary Authorities of East Sussex), drew attention to the large difference between the death-rates of towns and villages which drew their water supplies from rivers, wells, and upland surface water, and gave a table of 207 towns. The death-rates of 76 towns taking their supplies from deep wells were considerably less than the death-rates of towns taking their supplies from other sources. Mention was made of the importance from a health point of view of the care that should be taken in all methods of filtration. It was better, if possible, to do without filtration, as the water did not lose its natural vitality, due to the presence of carbonic acid gas, and retained a more pleasant taste, which was a matter of importance if water drinkers were to be encouraged. Filtered water always had a flat taste. Dr. Stott related that all the waters in East Sussex drawn from the Tunbridge Wells sands, and some from the Ashdown sands, contained carbonate of iron salts, and before these waters were available for drinking purposes, the iron had to be got rid of. This was an easy matter, agitation and exposure to air and sunlight, filtration through sand, depositing the iron with a solution of lime water, or what had been described as the process in use at Hastings by the pressure filters charged with magnetic oxide of iron. The advantages of employing lime process was that probably more bacteria were removed from the water than by any other process. In some instances 99 per cent. of the bacteria present had been removed. Dr. Stott thought the last two paragraphs of Dr. Wilson's paper the most important points, and insisted that care and attention to the minute details of any process of filtration, whether mechanical or artificial, must be given, so that water obtained from a pure source should not be rendered impure by artificial methods. There should not only be supervision at the works but strict attention all along the distributing conduits.

MR. WM. WHITAKER (Croydon), speaking of the use of the Thames water for the supply of London, said there was no doubt that the work of filtration in this case was remarkably well done. Of course, accidents always would happen, but what they had to do was to minimise the risk as far as possible, and not leave the work in the hands of careless men. Where a place could get a supply that was absolutely pure it ought to get it; and it became a great question in the case of a place like London whether the authorities would not have to consider the advisability of largely supplementing the supply from sources other than the river. All rivers, of course, were not like the Thames: it was an exceptional stream, and there was no other river in the country that could give a similar supply. They might regard the Thames generally as being a river of spring-water. Contrasting this with the river from which Lincoln

obtained its supply, he mentioned that there the river was mainly the result of the drainage of a clay-tract, and its flow was often small, occasionally, indeed, at the rate of 2,000,000 gallons per day, out of which the city required 1,500,000 gallons, the result being that they had almost to take mud and all. He said that the economy of using pressure-filters would be recognised; and economy must be considered.

DR. DAVID SOMMERVILLE (King's College, London) said they were all agreed that no method of filtration was perfect, and that it was of prime importance that pathogenic germs should be wholly cut out of a potable water supply. They ought to accept with some reserve the glowing accounts of the results obtained by pressure filters. Rapid filtration under pressure increased the opportunities for the passage of microbes. The frequent cleansing of pressure filters, by breaking up the surface film (the true microbic-filtering apparatus), was perhaps the principal objection to their use as bacteriological purifiers of water. For strictly chemical purposes no doubt these filters were good, and in the case of the Hastings water supply, which, prior to filtration, was bacteriologically pure, no objection could be offered to their use; but in cases of organically foul waters the matter was very different. In the United States (from whence came a short time ago brilliant descriptions of their efficacy) he found, amongst some of the best informed water experts, a feeling of disappointment, which in certain quarters assumed the practical form of abandonment of these filters by reason of their bacteriological inefficiency. The last word had not yet been said on the bacteriological filtration of water; and it was, to say the least of it, hardly justifiable to compare the water supplies of this country, which were largely in more or less intimate relations with cultivated lands, with the huge tracts in America, comprising in some places thousands of square miles of the purest catchment areas. As Americans had admitted to him in their own country that certain pressure filters had been a bacteriological failure, he thought it better, in the present state of their knowledge, to leave the question of their adoption for bacterial filtration open, and to emphasise, with Mr. Whitaker, the necessity of procuring the very best sources for water supplies, so that as little work as possible should be left to filters. Acting on his advice, a water corporation in Dorset had recently thrown over the idea of completing the purification of an inferior water, and had selected a new and pure source of supply. This example might be profitably followed in other parts of England.

MR. WILLIAM BOBY (London) said that he had an opportunity of seeing two sets of filtering plant on the Continent in the summer of this year, and of these he thought that some particulars might be interesting. One of the sets of plant was at Ostend, and the other at Middelkerke, a small town about six miles from Ostend. The difficulty of obtaining a good water supply in the towns situated along the coast-line of Belgium is well known, and possibly such onerous condi-

tions might not be met with in England, or very rarely so. At Ostend the plant consisted of ten filters. The water was drawn from a canal, and was both turbid and of a very green colour. It was pumped from a settling pond to a receiving tank, whence it flowed to the filters, which were open at their tops, and therefore avoided the objection that had been referred to of enclosing the water and preventing its contact with the atmosphere. On its way to the filters a small amount of coagulant was mixed with the water, and on leaving the filters it received a chemical treatment which sterilised it. After this it passed to another reservoir from which it was pumped to the elevated service tank. As drawn from the service cocks in the town it was a very fair sample of potable water, its colour having disappeared, and its appearance and palatability being of a fair average quality. The second installation at Middelkerke the speaker considered to be more interesting, from the fact that a special chemical treatment was employed which was devised by a chemist holding an official position in the Belgian Civil Service. The name given to the process was "Ferrochlore." The treatment consisted of dosing the water with two chemicals, which were separately dissolved in two small tanks, one of the chemicals being chlorinated lime and the other perchloride of iron. The two solutions were mixed as they left the two tanks, and flowed into the water which was on its way to the filters, the effect being to sterilise the water; after which the iron fell upon the surface of the filter bed in the form of a gelatinous film which rendered the filter highly efficient, so that the treated water was limpid and sparkling. The crude water as inspected by him was not turbid, but fairly bright in appearance, its colour, however, was a bright brown, which he compared to the tint of burnt sienna, so that it had the appearance of a fairly pale sherry; it also had a bitter and most unpleasant taste. The water drawn from the service taps had no colour, and was agreeable to drink, in fact a good sample of potable water. Both the Belgian and French Government Authorities had reported on this installation as being satisfactory, and the water good from a chemical and bacteriological point of view. An installation had been set up in Paris and also in the south of France, both of which have been approved by the Government and Local Authorities.

DR. ALLFREY (St. Leonards) said that he was glad to hear the remarks made by Dr. Foulerton and others with regard to the use of the Porter-Clark process for softening water, and especially the strong testimony that they bore to the use the process served in the bacteriological purification of the water. This was new to him, and he thought that pressure might be brought to bear on the water companies to induce them to soften their waters. He had resided and practised a great many years in Kent, in the district of Chislehurst and the Crays. During thirteen years of that time the district was supplied by the Kent Company's very hard water. The hardness was an intolerable nuisance. He had not observed that it was in any way injurious to health, or predisposed in any way to gouty ailments, as was popularly supposed. He thought that when

this was so—as, for instance, in Norfolk—then other factors were concerned besides the hard water. The water choked up the pipes, and furred and destroyed the boilers, besides its unsuitability for washing purposes. He had tried in vain to induce the company, through their secretary, Mr. Dickson, to soften the water. He had pointed out that it was to his company's interest to do so; and that he was frequently consulted as to the character of the water by people who proposed to come to reside in the district, and who would not come because they disliked hard water. He had ascertained from the officials of the Surrey Company that the cost would probably only have pulled down the dividend of 11½ per cent. about ½ per cent.

THE CHAIRMAN (Colonel J. Lane Notter), in summing up the discussion, said Hastings must be congratulated on its excellent supply of pure water and upon the care exercised in its distribution. The question of the use of pressure filters largely depended on the source and nature of the water supply. They appeared to suit the Hastings water admirably, and as far as he could ascertain worked well and satisfactorily. Whether they would be equally successful in purifying a river water, such as the Lee, was still *sub judice*. He advocated a measure by Government which would control the water supplies of the whole country, so that those districts that could not obtain a pure supply within their own area, could go outside it, without injury to neighbouring districts. Our sources of water supply were limited and they were being continually taken up by large centres of population. London was an exceptional city. The Thames derived its supply largely from springs at Reading, and the water partook of the character of spring water rather than that of river water. London could never afford to give up the Thames, although it was possible it may have to obtain water from an anxiliary source. Small rivers were always a dangerous source of supply and required constant supervision and efficient filtration.

MR. P. H. PALMER in reply said that no filters—either open sand filters or pressure filters—would take care of themselves. They both required proper care and management. It was necessary that the pressure filters should have periods of rest and have all the water drained out and the waste left open for a day or two. Some of the drawbacks to the ordinary open sand filter, where water containing a large amount of iron had to be dealt with, were as follows: the sand became clogged (owing to the iron) in a very short time, in some cases a period of only a few hours. In order to assist the filter the men in charge will attempt to disturb the sand by rakes or other means, and let the water through without being properly filtered. The pressure filter was not likely to be subjected to this treatment; it was also not affected by climatic changes, which in this country materially affected the process of filtration in open sand beds. Even in the South of England filter beds in the winter time were frequently frozen to a slight depth. The pressure filters could be sterilised; and those which were

erected for the Hastings Corporation at West Hill were at the time fitted with a sterilising apparatus worked by low pressure steam from a quick-steaming boiler. The cost of cleansing the pressure filter as compared with the open sand filter, was infinitesimal; and the first cost of the filter was also lower, He should like to point out that although the word "mechanical" filter had been used in respect to the Candy filter, there was no mechanical contrivance connected with it; the whole of the working was simply arranged and regulated by means of valves. Pressure filters were distinctly coming into favour in this country. Amongst a number of places where they were in use might be mentioned Crewe, Aberdare, Leighton Buzzard, Newport, Cardiff, Bedford, and Lynton. He was pleased that the subject had been the means of creating a good discussion; and no doubt when the members had seen the Candy filters at work at Brede they would be satisfied that there was a very big future for pressure filters.

Mr. Frank Candy (Westminster) has sent the following description of the Automatic Compressed Air and Oxidising system used at Hastings, as it appeared to him from some remarks made at the meeting that the filters were not fully understood. The first action of the filter is to automatically compress the atmospheric air into the water undergoing filtration, saturating it with dissolved oxygen. Unlike sand, which merely acts mechanically as a strainer, the Candy filter has a double action; first, it arrests the suspended matter and bacteria, and secondly, it oxidises by chemical wet combustion, both organic matter and iron in solution. Filtration takes place downward, and the unfiltered water is forced into each filter by means of a rising supply pipe through the side or top. When it is necessary to cleanse a filter (the frequency for which is dependent on the impurity of the water under treatment, and may vary from once a day to once a week), it is effected by closing the unfiltered water inlet valve and opening the wash-out valve, when filtered water from an adjoining filter of the battery enters the bottom of the filter, and passes up through the filtering material, carrying away the arrested solids and bacteria. The time occupied in cleansing and restarting the filters occupies from five to ten minutes. It is a misconception that this form of closed filter has to be worked under great pressure; the pressure need not be more than that of an open sand filter, because the difference in the pressure between the inlet and outlets is not more than 3 to 5 lbs.; if the pressure at the pump is 145 lbs. then the filter would deliver at about 140 lbs. pressure. No manual labour beyond the mere opening and closing of the valves is needed either for cleansing or working the filters, and no auxiliary mechanical power is employed. The cost of cleansing and working the filters is found by actual experience to be

about *one penny* per 50,000 gallons for a town's supply of one million gallons a day. During the process of washing, the filtering media is not disturbed or broken up; the importance of this it is needless to dwell upon. The quantity of water used for washing is exceedingly small, being less than one-fifteenth per cent. of the water filtered, or in other words for 1,750,000 gallons of water filtered, only 1,000 gallons are needed for washing.

Filters at the Brede Pumping Station of the Hastings Corporation.

NOTES ON LEGISLATION AND LAW CASES.

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SALE OF FOOD AND DRUGS ACT.—*Taking of Samples.*

In the High Court of Justice, King's Bench Division. (Divisional Court). Royal Courts of Justice, Wednesday, 2nd August, 1905.

Before the LORD CHIEF JUSTICE, Mr. Justice LAWRENCE, and Mr. Justice RIDLEY.

WORTHINGTON v. KYME.

The point which is raised by the case is this, whether an inspector of nuisances appointed by an ordinary urban sanitary authority or borough not having a quarter sessions can take proceedings for the infringement of the Sale of Food and Drugs Act, 1875, the suggestion being that no inspector of nuisances or other officer except the officer of a borough having a court of quarter sessions, or of a county council, can take such proceedings.

The Lord Chief Justice held that a medical officer of health, an inspector of nuisances, inspector of weights and measures, and other people are entitled to take samples and entitled to have them analysed, and the people who may take samples may take proceedings when the result of the analysis is arrived at. It is said that the jurisdiction of the magistrates to hear and determine an information alleged by an inspector of nuisances who has got a sample, and has had it analysed, and has done everything, depends upon whether he was appointed under such circumstances that the authority for whom he was inspector of nuisances could take proceedings. It is said that not being able to appoint an analyst they could not take proceedings themselves, and that therefore their inspector of nuisances could not take proceedings. I am quite unable to follow that.

CONVENIENCES.—*Local Government—Public Health—Sanitary Authority—Power to provide Sanitary Conveniences—Bonâ fide use of Statutory Powers—Public Health (London) Act, 1891 (54 & 56 Vict. c. 76), s. 44.*

In providing sanitary conveniences under the Public Health (London) Act, 1891, s. 44, the sanitary authority must use their statutory powers bonâ fide and reasonably, and if they so act their discretion as to the mode of acting cannot be interfered with.

Where the conveniences are so provided under a street with a subway it is no objection that the public can use the subway as a means of passing from one side of the street to the other.

The decision of the Court of Appeal, [1904] 1 Ch. 759, reversed upon the facts, and the decision of Joyce, J., [1902] 1 Ch. 269, restored by the Earl of Halsbury L.C. and Lords Macnaghten and Lindley, Lord James dissenting.

WESTMINSTER CORPORATION *v.* LONDON AND NORTH WESTERN RAILWAY COMPANY. H.L. E. (1905) 426.

ELECTRIC LIGHT.—*Local Authority—Electric Lighting—Land acquired under Special Act for Electric Generating Station—Erection of Refuse Destructor on part of Land so acquired—Combined Scheme—Ultra Vires—Injunction —Public Health Act, 1875 (38 & 39 Vict. c. 55) s. 175—Electric Lighting Act, 1882 (45 & 46 Vic. c. 56), s. 10—Electric Lighting (Clauses) Act, 1899 (62 & 63 Vict. c. 19), s. 1; Schedule, clauses 2, 8.*

The principles which govern the provisions of s. 175 of the Public Health Act, 1875, also apply to similar provisions in clause 8 of the schedule to the Electric Lighting (Clauses) Act, 1899.

Where therefore a local authority, under the powers of the Electric Lighting Acts and a provisional order confirmed by a special Act, acquire land for the purpose of erecting thereon a generating station for the supply of electricity to their district, they cannot use any part of the land, for the time being not required for those purposes, for any purpose not authorised by the order or inconsistent with the purposes for which the land was acquired.

A sale under clause 8 in the schedule to the Electric Lighting (Clauses) Act, 1899, of part of the land acquired for electric lighting purposes, but not required for those purposes, must be a bonâ fide out and out sale, and not a mere paper transaction of sale and repurchase, though made in good faith, with the object of evading a statutory prohibition.

A local authority under the powers of the Electric Lighting Acts and their special order acquired land by agreement for the purpose of erecting thereon a generating station for supplying electricity to their district. At the time they bought the land they had formed a scheme, on the advice of their electrical engineer, under which they intended to erect on part of the land a refuse destructor to be worked in connection with an electric generating station, the refuse to be utilised as fuel to generate steam to be used as additional motive power for driving the dynamos in the adjoining generating station; but the vendors of the land were not informed of the scheme. After the land was conveyed to the local authority they began to erect the destructor on part of it in furtherance of their scheme:—

Held, that the destructor was no part of the electric generating station, and that it was ultra vires of the local authority to erect it on any portion of the land they had acquired under their special order.

Attorney-General v. *Teddington Urban Council*, [1898] *1 Ch. 66*, and *Attorney-General* v. *Hanwell Urban Council*, [1900] *2 Ch. 377*, applied and followed.

ATTORNEY-GENERAL *v.* PONTYPRIDD URBAN DISTRICT COUNCIL, FARWELL J. C.D. (1905) 441.

LODGING-HOUSES.—*Common Lodging-house—Registration—Licence—Charitable Institution—Payment by Inmates—Local Government—Common Lodging Houses Act, 1851 (14 & 15 Vict. c. 28), ss. 6, 8, 12, 14—Common Lodging Houses Act, 1853 (16 & 17 Vict. c. 41), ss. 3, 11—London County Council (General Powers) Act, 1902 (2 Edw. 7, c. clxxiii), Part IX.—Common Lodging Houses Act, Ireland, 1860 (23 Vict. c. 26), ss. 2, 3.*

The expression "common lodging house" in the Common Lodging Houses Acts, 1851 and 1853, is explained by the Common Lodging Houses Act,

INDEX TO NOTES ON LAW CASES, 1894—1905.

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JOURNAL SUPPLEMENT

OF

THE ROYAL SANITARY INSTITUTE.

(Being Supplement to Vol. XXVI. of Transactions.)

1905.

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ABSTRACTORS OF TITLES OF ARTICLES RELATING TO PUBLIC HEALTH.

H. Adams, M.INST.C.E.

H. E. Armstrong, D.HYG.

Prof. H. R. Kenwood, M.A., D.P.H.

C. Mason, ASSOC.M.INST.C.E.

G. Reid, M.D., D.P.H.

S. Rideal, D.SC., F.I.C., F.C.S.

H. A. Roechling, ASSOC.M.INST.C.E.

J. Osborne Smith, F.R.I.B.A.

The Institute is not responsible for the facts and opinions advanced in the Addresses, Papers, and Articles published in the Journal.

SUPPLEMENT.

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THE ROYAL SANITARY INSTITUTE.

ANNUAL REPORT OF THE COUNCIL

FOR THE YEAR 1904.

Read at the Ordinary General Meeting, March 22nd, 1905.

INTRODUCTION.

It is a matter of satisfaction to the Council that, in presenting this Report, it is issued under a different title for the Institute, His Majesty the King having graciously accorded his patronage to the Institute, and having signified his pleasure that the Institute be known as The Royal Sanitary Institute. Extraordinary General Meetings were held on October 24th and November 9th to make the necessary alterations in the Memorandum and Articles of Association and Regulations of the Institute.

The year 1904 has been mournfully marked by the death of the President, His Royal Highness the Duke of Cambridge, who had graciously given his support to the Institute since the year 1883. The Council referred to this loss in presenting their last report, and an obituary notice prepared by Sir Joseph Fayrer appears in Part I. of the Journal, Vol. XXV.

The office of President has been filled by His Grace the Duke of Northumberland, and as the late Duke of Northumberland presided at the meeting inaugurating the Institute in 1876, it is a happy omen for the future of the Institute that it should now continue its career under the auspices of the House of Northumberland.

HENRY SAXON SNELL LEGACY.

Mr. Saxon Snell, whose death is recorded in the Obituary notice in Part I. of the Journal, was for very many years a Member of the Council of the Institute. By his will he left a legacy of £750 to be applied as to £50 thereof, as soon as possible, and as to the income of the remaining £700, every third year afterwards, for a Scholarship or Prize, to be called the "Henry Saxon Snell Scholarship or Prize," to encourage improvements in the construction or adaptation of Sanitary Appliances.

It has been decided to offer the prize in the first instance for an Essay on "Domestic Sanitary Appliances, with suggestions for their

improvement." The conditions under which the prize is offered are set out in Part III. of Vol. XXV. of the Journal, page 1015.

NEW PREMISES.

The question of the Institute's premises, which are at present inadequate for the work which it has to perform, has been engaging the most serious attention of the Council, and is still under discussion.

ASSOCIATED WORK.

A joint deputation—representing The Royal Statistical Society, The British Medical Association, The Incorporated Society of Medical Officers of Health, The Institute of Actuaries, and The Sanitary Institute—waited upon the President of the Local Government Board (Mr. Walter Long) on May 13th to urge upon the Government the importance of establishing a quinquennial census of the United Kingdom; Sir Michael Foster, M.P., and Mr. Ernest Gray, M.P., were also present. The Sanitary Institute was represented by SIR FRANCIS SHARP POWELL (Vice-President) who introduced the deputation, MR. A. WYNTER BLYTH (Vice-President and Registrar), MR. W. WHITAKER, B.A., F.R.S. (Chairman of Council), PROF. H. R. KENWOOD, M.B., D.P.H., MR. J. E. WORTH, M.INST.C.E., and MR. E. WHITE WALLIS (Secretary).

MR. WYNTER BLYTH urged on behalf of The Sanitary Institute the great importance of accurate statistics as supplying the only true indication of the state of health of the population.

MR. LONG promised to bring the matter before the Treasury.

SANITARY LEGISLATION.

The Institute had under consideration the following Bills introduced into Parliament during the year. The action taken by the Council and the fate of the Bill is noted in each case:—

Prevention of Pollution of Rivers and Streams Bill. Introduced by Sir Francis Sharp Powell, Bart., supported by Sir W. H. Wilson-Todd, Mr. Henry Hobhouse, Sir John Dorington, Dr. Farquharson, Mr. Brigg, Sir John Brunner, and Sir Walter Foster.

A Bill to make further and amended provisions to prevent the Pollution of Rivers and Streams.

Decided to petition in favour of this Bill.

The Bill was dropped.

Re-Vaccination Bill. Introduced by Sir John Tuke, supported by Sir Michael Foster, Mr. Haldane, Dr. Farquharson, Captain Jessel, Mr. Malcolm, Mr. T. P. O'Connor, Mr. Heywood

Johnstone, Mr. Cohen, Mr. Moon, Sir Charles Dalrymple, and Sir John Dorington.

A Bill to provide for the Re-vaccination of Children after the age of Twelve.

Decided to petition in favour of this Bill.

The Bill was withdrawn.

Sale of Butter Bill. Ordered to be brought in by Mr. Ailwyn Fellowes, Mr. Long, and Mr. Solicitor-General.

A Bill to amend the Law with regard to the Sale of Butter.

Decided to petition in favour of this Bill.

The Bill was withdrawn.

Housing of the Working Classes, &c., Bill. Presented by Mr. Nannetti, supported by Mr. Harwood, Mr. Field, Captain Norton, Mr. Keir-Hardie, Mr. Bell, Mr. Crooks, Sir Fortescue Flannery, Mr. Joyce, Dr. Farquharson, Mr. Fenwick, Mr. Jacoby, and Mr. Logan.

A Bill to amend the Law relating to the Housing of the Working Classes, to amend the Law of Rating, and to establish Fair Rent Courts.

Decided that no action be taken.

The Bill was dropped.

Factory and Workshop Act, 1901, *Amendment Bill.* Presented by Mr. Tennant, supported by Captain Norton, Mr. Hugh Law, Sir John Stirling-Maxwell, Mr. Burns, Sir John Dickson-Poynder, and Mr. Peel.

A Bill to amend the Law relating to the provisions for escape from Fire in Factories and Workshops.

Decided to petition in favour of this Bill.

The Bill was dropped.

Vaccination Bill. Presented by Mr. Broadhurst, supported by Mr. Thomas Bayley, Sir John Rolleston, Mr. Channing, Mr. Levy, and Mr. Corrie Grant.

A Bill to amend the Vaccination Acts.

Decided to petition against this Bill.

The Bill was dropped.

SESSIONAL MEETINGS.

Sessional Meetings have been held in London and in provincial centres, in order that the members of the Institute in all parts of the kingdom may have an opportunity of meeting together under the auspices of the Institute, for the reading and discussion of papers.

Meetings were held in London in February, March, April, and November.

Provincial Meetings were held during the year in Manchester, Cardiff, Southampton, and Nottingham; the discussions being arranged in the morning, and demonstration visits in the afternoon to Sanitary works relating to the subjects discussed. There was an attendance at the various meetings ranging from 60 to 175.

The Institute is indebted to Dr. P. Boobbyer, Mr. James Lemon, M.Inst.C.E., Prof. J. Radcliffe, and Dr. E. Walford, who very kindly acted as Local Secretaries and organised these successful meetings.

Hospitality was kindly extended to the Members by the Health Committees of Cardiff, Southampton, and Nottingham.

At the several meetings the following subjects were brought forward:—

"The Ventilation of Dwellings, Workshops, Hospitals and Schools," by EDWIN T. HALL, F.R.I.B.A.; W. Whitaker, B.A., F.R.S., F.G.S., Chairman of the Council, in the Chair.

"Road Sanitation," by J. PATTEN BARBER, M.INST.C.E., and LOUIS C. PARKES, M.D., D.P.H.; The Right Hon. Lord Monkswell, Chairman of the London County Council, in the chair.

"Municipal Rehousing," by W. E. RILEY, F.R.I.B.A., Superintending Architect, London County Council; The Worshipful the Mayor of St. Marylebone (Rev. H. Russell Wakefield) in the chair.

"School Hygiene in its Relation to Education Authorities," by E. WALFORD, M.D., D.P.H.; W. Whitaker, B.A., F.R.S., F.G.S., Chairman of the Council, in the chair.

"Food and Meat Inspection," by Col. J. LANE NOTTER, R.A.M.C., M.D., D.P.H., and W. HUNTING, F.R.C.V.S.; Chas. Game, Chairman of the Cattle Markets' Committee, Corporation of London, in the chair.

"Infectious Fever Hospitals," by R. E. LAUDER, F.R.C.S., D.P.H.; W. Whitaker, B.A., F.R.S., F.G.S., Chairman of Council, in the chair.

"Some Present Day Aspects of Conservancy Systems," by PHILIP BOOBBYER, M.D., M.S., M.R.C.S.; W. Whitaker, B.A., F.R.S., F.G.S., Chairman of Council, in the chair.

In connection with the meetings, visits were made to the L.C.C. Bourne Estate, Clerkenwell; L.C.C. Cottage Estate, Tottenham; Metropolitan Cattle Market, Islington; Isolation Hospital and Crematorium on the Flat Holm, and to Barry Dock, Cardiff; New Infectious Diseases Hospital and Workhouse Infirmary, Southampton; Bacteriological and Chemical Laboratory, Destructor Works and Sanitary Wharves, and Works of Goddard, Massey & Warner Nottingham.

A Conference, arranged by The Royal Sanitary Institute and the

King Alfred School Society, was held in November, when a discussion on "Recent Educational Developments, with special reference to the new Education Code and the Report of the Mosely Commission," was opened by ALFRED GREENWOOD, M.D., D.P.H., and J. OSBORNE SMITH, F.R.I.B.A.; presided over by the Rev. H. B. Gray, D.D., Warden of Bradfield College. At the second meeting T. GREGORY FOSTER, PH.D., and A. J. SHEPHEARD, Vice-Chairman L.C.C. Education Committee, opened the discussion; Sir James Crichton Browne, LL.D., M.D., F.R.S., presiding.

The papers read and discussions upon them are printed in the Journal, Vol. XXV.

The Council will be glad to receive from members any proposals as to appropriate subjects for discussion and centres in which future meetings might be held.

LECTURES AND DEMONSTRATION ON SANITARY SCIENCE.

At the Thirty-seventh Course of Training held in February, March, and April, 36 Students entered their names, and at the Thirty-eighth Course in September, October, and November 58 Students were enrolled.

The Objects and Appliances in the Parkes Museum, where the Lectures are given, are used for the purpose of practically illustrating the Lectures; and other objects, such as Carcases and Organs of Animals, are obtained for demonstration.

A complete list of the Lectures has been given in the Supplement to the Journal.

Technical Exhibitions are awarded to Students by the Technical Education Board of the London County Council to the annual value of five pounds, which may, with the approval of the Board, be applied to paying the expenses of Students in attending these Lectures.

INSPECTIONS AND DEMONSTRATIONS.

In addition to the 32 Lectures and the Demonstrations given in the Museum during each Course, arrangements were made for Students to visit a number of public works illustrative of sanitary practice and administration, in order that they might have the opportunity of observing and noting the practical application of Sanitary principles.

During the period over which each Course of Lectures extended, the Students had the free use of the Library and Museum at all times when they were open.

The Council desire to record their sincere thanks to the Lecturers for the great benefits they have conferred upon the Students, and

for the assistance they have given to the diffusion of Sanitary knowledge by the preparation and delivery of these Lectures, and also to those gentlemen who have taken so much trouble to make the various inspections and demonstrations instructive to the Students.

The Institute is also indebted to the London County Council, Metropolitan Borough Councils and District Councils, and others who are so kindly assisting them with regard to the visits, and in bringing the Lectures under the notice of their officers.

PRACTICAL TRAINING FOR MEAT INSPECTORS.

In addition to the Course of general Lectures for Sanitary Officers, special Courses were arranged during the year for candidates preparing for the Examination for Inspectors of Meat and other Foods, conducted by The Royal Sanitary Institute.

Each Course consisted of two months practical training in the inspection of meat at a Cattle Market, including demonstrations on live cattle and sheep, slaughtering and dressing of animals, names and situations of the organs, diseases of animals, methods of stalling, arrangement of markets and byres, &c.

Demonstrations were also arranged at a knackers' yard, where instruction regarding the flesh and organs of the horse was given.

One Course was held in the Spring and another in the Autumn, and each continued for two months. At the first Course there were 16 Students, and at the second 9 Students.

A Special Course of Training in Food and Meat Inspection for Commissioned Officers and Professional Men was arranged, and consisted of lectures on tinned and potted foods, milk, butter and cheese, fish, eggs, tea, coffee, cocoa, grains, bread, vegetables, condiments, preserved foods, beverages, etc., in addition to the lectures on Meat Inspection and practical demonstrations at the Cattle Market.

COURSE OF TRAINING IN APPLIED HYGIENE FOR SCHOOL TEACHERS.

A Course was arranged, in conjunction with Bedford College for Women, and it occupied three terms of the year, and consisted of Lectures and practical Demonstrations on the following subjects :—

Physiology and the allied Sciences, Infectious Diseases and Disinfection,

Construction and practical Sanitation of Schools,

Hygiene in School life and in Educational methods.

The Lectures were given partly at the Institute and partly at Bedford College, and were attended by 28 Students.

EXAMINATIONS.

It has always been the desire of the Council to ensure, as far as possible, that the Certificates granted by the Institute should be given to men who have a practical knowledge of the duties they have to undertake. This is to a great extent secured by the *vivâ voce* portion of the Examination, but as it was found that a number of candidates presented themselves who had only studied the subject theoretically, and had no chance of passing, the Council therefore adopted a regulation requiring all candidates to give evidence of practical training. As was anticipated, this excluded a number of candidates and considerably reduced the numbers entering for the Examination, but it is hoped that it will tend to secure a more practical class of men entering for the Examination.

In order to assist those candidates who propose to prepare themselves for the duties of a Sanitary Inspector, the Council of the Institute have addressed a letter to the Sanitary Authorities in England, asking if they would grant facilities to suitable candidates for going round with the acting Inspector on some of his visits at certain convenient times, in order to gain a practical insight into the duties of a Sanitary Inspector.

During the year Examinations were held at the following places:

IN PRACTICAL SANITARY SCIENCE.

Birmingham	London (2)
Cardiff	Manchester (2)
Cork	Newcastle-upon-Tyne
Leeds	Nottingham
Liverpool (2)	Plymouth

71 Candidates presented themselves, to 24 of whom Certificates were granted.

FOR INSPECTORS OF NUISANCES UNDER THE PUBLIC HEALTH ACT, 1875.

Birmingham	London (2)
Cardiff	Manchester (2)
Cork	Newcastle-upon-Tyne
Edinburgh	Nottingham
Leeds	Plymouth
Liverpool (2)	

At these Examinations 685 Candidates presented themselves, and 303 were certified competent, as regards their Sanitary knowledge, to discharge the duties of an Inspector of Nuisances under the Public Health Act, 1875.

certificate a qualification for any new appointment, especially when they wish to claim the moiety of salary of such officer from the Department of Public Health under the provisions of the Public Health Act.

Examinations were established by the Institute in 1877, and the following figures show the total number of Examinations held, and the number of Candidates :—

	Examinations.	Candidates Entered.	Candidates Certificated.
For Local Surveyors	35	291	142
Practical Sanitary Science....	90	536	243
Inspectors of Nuisances	191	9,369	4,976
Inspectors of Meat and Other Foods	22	280	193
Practical Hygiene for School Teachers	10	57	38
	348	10,533	5,592

CONGRESS AND EXHIBITION AT GLASGOW.

The Twenty-Second Congress and Exhibition of the Institute was held at Glasgow from July 25th to 30th, 1904.

Very suitable accommodation was provided for the meetings of the Congress in the University and St. Andrew's Halls, and excellent arrangements were made for the reception and convenience of members. The Exhibition was held in the East End Exhibition Buildings.

Delegates were appointed by about 326 Sanitary Authorities and Learned Societies.

The numbers attending the Congress were as follows :—Delegates, 620; Members and Associates of the Institute, 305; Associates of the Congress and other Subscribers, 113; Complimentary and Press, 300; making a total of 1,338.

The first General Meeting was held on July 25th. The Right Hon. Lord Blythswood, Lord Lieutenant of Renfrewshire, was installed as President of the Congress, and delivered his Inaugural Address.

The business of the Congress was divided into three Sections and eight special Conferences: Section I., Sanitary Science and Preventive Medicine; Section II., Engineering and Architecture; Section III., Chemistry, Physics, and Biology. Conferences: of Municipal Representatives; of Medical Officers of Health; of Engineers and Surveyors to County and other Sanitary Authorities;

of Veterinary Inspectors; of Sanitary Inspectors; of Women on Hygiene; of Industrial Hygiene; of the Hygiene of School Life. Many subjects of special interest were brought forward and discussed —the papers, together with the discussions, appear in Vol. XXV. of the Journal.

During the meeting the following excursions were made:—Messrs. Shanks & Co.'s Works, Barrhead; Earnock Collieries, Hamilton; Sewage Purification Works, Dalmuir; Gareloch, Loch Long, and Loch Lomond; Kilchattan Bay and Rothesay; Trossachs; Lanark, the Falls of Clyde, and Craignethan Castle; Loch Eck and Loch Fyne; Campbeltown; Burns Monument and Cottage; Knockdon Farm and Culzean Castle; and an Evening Cruise up Loch Goil, an Inspection of the Harbour, and a Sail down the Clyde were arranged.

The members were most hospitably entertained—at garden parties, at the Botanic Gardens, and the Ruchill Hospital, by the Corporation, and at the excursions by Mr. W. Graham, Messrs. Shanks & Co., the Glasgow Corporation, and others.

Visits were also made to the Municipal Undertakings of the Corporation. Several of these visits were of great value to members, and especially to officers and members of Local Authorities, and officials appointed as delegates to the Congress.

The Health Exhibition was held at the East End Exhibition Buildings, and was open for twenty-one days. It was attended by 16,583 visitors. A list of the Exhibits to which medals were awarded is given in the Supplement to the Journal, Vol. XXV., Part II., 1904, and also a list of certain Exhibits which required special tests in London or elsewhere before their merits could be decided upon by the Judges.

As an additional feature of the Exhibition, and with a view to bringing before the visitors to the Exhibition the question of hygiene from its personal aspect, the Council arranged the following series of lectures on Health. In these lectures the subjects were treated in a popular manner and illustrated with lantern views. They were well attended:—

"Feeding and Digestion." Prof. A. BOSTOCK HILL, M.D., M.SC., D.P.H., F.I.C.

"Care of Eyesight." JAMES KERR, M.A., M.D., D.P.H

"Care of Teeth." GEO. CUNNINGHAM, M.A., L.D.S.Eng.

"Physical Development: with special reference to the Jiu Jitzu method of Physical Training." PHILIP BOOBBYER, M.D., M.R.C.S.

"Healthy Houses." Prof. H. R. KENWOOD, M.B., L.R.C.P., D.P.H.

"What the People sleep on." PETER FYFE, F.R.S.E.

SUPPLEMENT.

The Illustrated List of Exhibits to which medals have been awarded has been published by the Institute since 1892. The list (a new edition of which is now in the press) contains illustrations, descriptions, and prices of a large number of sanitary appliances and articles of domestic use and economy, and is, the Council believe, of value for reference.

LIBRARY.

Volumes and Pamphlets numbering 395 have been presented to the Library. Lists of these are published in the Supplement to the Journal.

The Library was largely used by Students at the various courses of Lectures.

For the convenience of Members, Associates, and Students who wish to borrow books for home reading, special arrangements have been made for the loan to them, at a small fee, of books from Lewis's Medical and Scientific Library, which contains a large number of recent text-books and standard works on Sanitation.

JOURNAL.

The records of the Transactions of the Institute are steadily increasing, and last year the Journal contained 1,112 pages, besides 209 pages of additional matter published in the Supplement.

The circulation has increased, and more than 4,500 copies of each part were issued last year.

The Journal this year is considerably larger than usual, owing to the increased number of meetings held by the Institute and to the insertion of some special papers accepted as valuable contributions by the Institute.

INSTITUTE DINNER.

Dr. Robert Farquharson, M.P., Vice-President, presided at the Dinner of the Institute, held at the Whitehall Rooms on May 2nd, at which there were 100 members and others present.

BUILDING FUND.

The Building Fund, including donations promised, now amounts to £10,164 9s. 0d.

PARKES MUSEUM.

The Museum, besides being a most important adjunct to the teaching work of the Institute, forms the basis of a large portion of

the teaching in practical Hygiene that is given in London, and an increasing number of Institutions have made use of the facilities it affords.

It should be noted that practically all the Lecturers and Professors of Public Health at the different London medical schools use the Museum for practical demonstrations to their students.

The visitors to the Museum during the year, including classes from Medical Colleges, Polytechnics, Science Centres, London County Council Schools, &c., and the estimated number of ordinary visitors, were as follows:—60 Institutions from which classes attended; 95 classes: 1,804 Students.

The estimate of ordinary visitors for the year is 8,000.

Thus it will be seen that 9,804 visits are recorded, in addition to the meetings and lectures arranged by the Institute, 1,800 of these being made by interested Students visiting the Museum by appointment for definite instruction.

The following Institutions were represented, some of which sent Students on two or more dates:—

Balham Polytechnic.
Battersea Polytechnic.
Beckenham Technical Institute.
Bedford College for Women.
Bloomfield Road School.
Borough Polytechnic.
Bow and Bromley Road Technical College.
Burghley Road, Kentish Town, School Hygiene Classes.
Cavendish Square Convent.
Charing Cross Hospital.
Clarendon Square, St. Aloysius Convent.
Croydon Polytechnic.
East Dulwich Institute.
Exeter Hall Ramblers' Club.
Goldsmiths' Institute.
Hackford Road Science Centre.
King's College.
Kingston Science Centre (Surrey County Council).
Lavender Hill School.
L. C. C. Training Institute.
London Day Training College, Southampton Row.
London Hospital (Public Health Students).
Madame Bergman Osterberg's Physical Training College, Dartford Heath, Kent.
Maddison Road School.
N. T. School of Cookery.
National Health Society.
Northern Polytechnic.
North Hackney High School.
Norwood School of Hygiene.
Norwood Technical Institute.
Oakfield Road School.
Penge Technical Institute.
People's Palace Institute.
Plumbers' Association, Dusseldorf.
Regent Street Polytechnic.
Rutland Street High School (Girls).
Sesame House.
Skinners' Company's School (Girls).
St. George's Hospital (Public Health Students).
St. Katherine's College, Tottenham.
St. Mary's Hospital Medical School.
St. Mary's Ramblers' Club.

SUPPLEMENT.

St. Thomas's Hospital.
South-Western Polytechnic.
Stamford Hill School.
Stanhope School.
Summer Avenue School.
Surveyors' Institution.
Thomas St. Polytechnic.
Thornton Heath Polytechnic.
Tottenham Polytechnic.
Trades' Training School, Great Titchfield Street.
Tylers' and Bricklayers' Society.
University College (Public Health Students).
Walthamstow Technical Institute.
Wandsworth Institute.
West Ham Technical Institute.
West Norwood Institute.
Whitelands College, Chelsea.
William Street Science Centre.

Fifty-seven additions of new exhibits have been made to the Museum during the year, particulars of which are given each quarter in the Supplement to the Journal.

The collection of lantern slides available to Members and Associates for lecture purposes contains some valuable illustrations, and has been largely used by the Members of the Institute, 829 slides having been hired during the year.

FINANCE.

The Statement of Income and Expenditure for the year shows a considerable balance of expenditure over receipts. This is largely accounted for by the fact that the Exhibition at Glasgow was altogether unremunerative, and involved an expenditure on the part of the Institute instead of contributing, as these Exhibitions usually do, towards the establishment charges and general expenses of the Institute.

A falling off in the receipts from Examinations, owing mainly to the new restriction with regard to the admission of candidates, taken together with the heavy cost of the Journal, has also contributed to increase the balance of expenditure over income.

These charges against the account are to a slight extent met by improvement on other items, and the net result is that the account shows a balance of expenditure of £780. This year of loss has been preceded by three years with balances to credit.

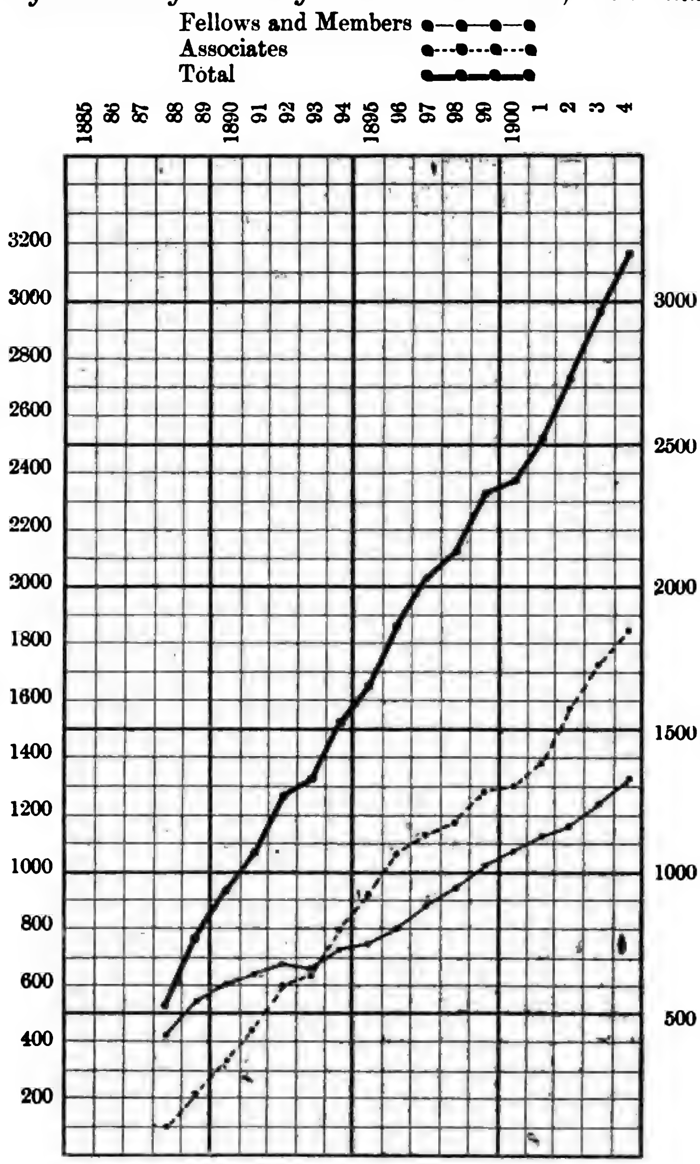
The estimates for this year show that the exceptional increase of expenditure is only of a temporary character, and that the probable result of the year's working for 1905 will leave a balance of receipts over expenses.

EPITOME OF REGISTERS OF MEMBERS AND ASSOCIATES.

The comparison of the roll of the Institute with the preceding year shows a steady increase in the number of Members and Associates.

	Hon. Fellows.	Fellows.	Members.	Associates.	Total.
Dec. 31st, 1903	43	186	1,013	1,722	2,964
Dec. 31st, 1904	43	193	1,083	1,836	3,155

Diagram showing the Yearly Increase in the Roll of the Institute.



OBITUARY.

It is with regret that the Council have to report the death of His Royal Highness THE DUKE OF CAMBRIDGE, *President*; Sir THOMAS SALT, Bart., Sir HENRY THOMPSON, Bart., *Vice-Presidents*; H. SAXON SNELL, *Member of Council*; PETER BURGESS, Dr. J. HARKER, A. HAVILAND, Dr. C. KELLY, Dr. G. V. POORE, Dr. J. B. RUSSELL, Sir E. H. SIEVEKING, P. GORDON SMITH, *Fellows*; G. A. ALLAN, Jun., Lieut.-Col. E. FERRAND, Col. E. C. S. MOORE, Dr. C. H. RUSSELL, E. SIMM, C. A. SWINBURNE, M. SYMONS, W. TITMAS, W. B. WILKINSON, *Members*: F. J. ANTHONY, Miss C. W. BYRNE, J. CROCKER, J. W. CULLEN, A. E. GARNHAM, W. J. HUGHES, F. T. JOHNSON, W. JONES, T. S. PRESCOTT, P. SHAW, Miss M. STEPHENSON, A. SUTTLE, G. N. WATTS, *Associates*.

EPITOME OF THE WORK OF THE INSTITUTE, 1904.

	LONDON MEETINGS AND EXAMINATIONS.	Total Attendance
4	Sessional Meetings for discussion of Sanitary subjects ..	338
64	Lectures to Sanitary Officers	3,581
2	Special Demonstrations, Inspection of Meat	144
38	Practical Demonstrations for Sanitary Officers	950
2	Examinations in Practical Sanitary Science	34
2	Examinations for Inspectors of Nuisances	191
2	Examinations for Inspectors of Meat	43
2	Examinations in Practical Hygiene for School Teachers	5
170	Council and Committee Meetings	1,071
95	Classes brought to the Museum	1,804
	Other persons visiting the Museum *(Estimated)*	8,000
21	Lectures on School Hygiene *(Estimated)*	550
2	Courses of Practical Instruction for Meat Inspectors lasting two months each *(Estimated)*	500
1	Special Course on Meat and Food Inspection *(Estimated)*	120

CONGRESS AND EXHIBITION AT GLASGOW.

6 Sectional Meetings	520
8 Conferences (12 sittings)	950
2 Addresses and Lectures	950
Popular Lectures at the Exhibition .. .. Exhibition open for twenty-one days	16,583

PROVINCIAL AND COLONIAL MEETINGS.

4 Sessional Meetings	375
13 Examinations in Practical Sanitary Science	47
16 Examinations for Inspectors of Nuisances	546
3 Examinations for Inspectors of Meat and other Foods ..	44
3 Examinations in Practical Hygiene for School Teachers..	17

W. WHITAKER,
Chairman of Council.

E. WHITE WALLIS,
Secretary.

March 8th, 1905.

STATEMENT of INCOME and EXPENDITURE

Dr. Expenditure.	£	s.	d.	£	s.	d.
Establishment Charges:—						
To Rent, Taxes, and Insurance	501	10	10			
„ Salaries and Wages	1,573	5	4			
„ Coals, Lighting, and Care of Offices	116	8	7			
„ Repairs and Alterations	26	10	1			
„ Arrangement of Museum	101	13	10			
„ Library, Binding, &c.	7	3	11			
„ Postage and Carriage	363	19	9			
„ Printing and Stationery	333	9	4			
„ Advertising	14	12	9			
„ Incidental Expenses	105	19	9			
„ Office Furniture	2	12	2			
„ Transferred to Sinking Fund for Contingencies	10	0	0			
„ Law Charges	5	0	4			
				3,162	6	[illegible]
Special Expenses, exclusive of Establishment Charges:—						
To Journal and Publications, Cost of Printing, etc., less Sales and Advertisements	1,050	18	5			
„ Sessional Meetings	74	0	6			
„ Lectures, Sanitary Officers	235	16	3			
„ „ School Hygiene	16	2	8			
„ „ Meat Inspectors	100	12	10			
„ Examination Expenses	1,334	2	10			
„ „ „ Colonial	179	18	10			
„ Congress at Glasgow	525	4	11			
„ Exhibition „	2,087	14	2			
„ List of Awards to Exhibits	16	10	10			
„ Experiments	10	8	8			
„ Institute Dinner—Balance of Expenses	31	4	0			
„ School Hygiene Assistance	35	12	0			
				5,698	6	11
				£8,860	13	7

ACCUMULATED

	£	s.	d.
To Amount allotted to Building Fund	1,000	0	0
„ Rogers Field Bequest, design and preparation of Medal	40	0	0
„ Income and Expenditure account—Balance transferred.	780	17	5
„ Balance to be carried forward to next account	6,912	15	11
	£8,733	13	4

for the Year ending 31st December, 1904.

INCOME.

	£	s.	d.	£	s.	d.
General Receipts:—						
By Annual Subscriptions, less Arrears written off	2,236	2	0			
„ Interest on Investments, etc.	471	19	3			
				2,708	1	3
Special Receipts:—						
„ Lectures, Sanitary Officers	269	9	4			
„ „ School Hygiene	16	10	6			
„ „ Meat Inspectors	102	7	6			
„ Examinations	2,349	13	8			
„ „ Colonial	186	0	0			
„ Congress at Glasgow	524	2	0			
„ Exhibition do.	1,918	16	10			
„ Farr's Works	4	15	1			
				5,371	14	11
				8,079	16	2
Balance carried to Accumulated Fund				780	17	5
				£8,860	13	7

FUND.

	£	s.	d.
By Balance brought forward from last account (1903)	8,733	13	4
	£8,733	13	4

BUILDING

	£	s.	d.
To Balance carried forward to next Account	9,753	3	0
	£9,753	3	0

SAXON SNELL

	£	s.	d.
To Balance carried forward to next Account	750	0	0
	£750	0	0

GENERAL BALANCE SHEET,

Liabilities.	£	s.	d.	£	s.	d.
To Fees and Subscriptions paid in advance for 1905	196	19	0			
„ Sundry Creditors	1,508	11	7			
				1,705	10	7
„ Library Catalogue Account, Balance at Credit thereof	98	2	9			
„ Life Composition Fund, Balance at Credit thereof	501	18	0			
„ Building Fund, Balance at Credit thereof	9,753	3	0			
„ Sinking Fund, Balance at Credit thereof	10	0	0			
„ Saxon Snell Prize Fund, Balance at Credit thereof	750	0	0			
				11,113	3	9
„ Income and Expenditure Account, Balance at Credit thereof				6,912	15	11
				£19,731	10	3

Examined with the Books, Vouchers, and Accounts, and found correct

FUND.

	£	s.	d.
By Balance brought forward from last Account	8,749	15	6
„ Transferred from Accumulated Fund	1,000	0	0
„ Donations	3	7	6
	£9,753	3	0

Further donations have been promised to the amount of £411 6s. 0d.

PRIZE FUND.

	£	s.	d.
By Legacy	750	0	0
	£750	0	0

31st DECEMBER, 1904.

ASSETS.	£	s.	d.	£	s.	d.
By Library and Contents of Museum, Furniture and Publications	1,438	1	6			
„ Subscriptions in Arrear	155	8	0			
„ Suspense Account, School Hygiene Conference and Exhibition	47	1	3			
„ Sundry Debtors	654	16	6			
„ Cash in hand	911	5	6			
				3,206	12	9
„ Investments valued at Cost—						
£7,658 11 1 2½% Consols	7,452	15	0			
£250 0 0 2½% „	220	1	0			
£1,000 0 0 3 % India Stock	1,095	1	0			
£1,000 0 0 3½% „	1,156	6	0			
£5,000 0 0 4 % New Zealand Stock	5,568	16	0			
£500 0 0 4 % „ „	529	8	6			
£500 0 0 3½% New South Wales Stock	502	10	0			
				16,524	17	6
The Market Value of these Securities on Dec. 31st, 1904, was £15,350 4s. 1d.						
				£19,731	10	3

WOOD, DREW & Co., Chartered Accountants, } *Auditors.*
W. COLLINGRIDGE, M.D.

THOMAS W. CUTLER, *Treasurer.*

REVIEWS OF BOOKS.

SANITARY LAW AND PRACTICE.*

We would say, at the outset, that this book marks a welcome departure from the beaten track of the average sanitary handbook. The title of the work would suggest dry reading, but the arrangement of the subject matter is so original and unique that it offers a really interesting account of sanitary law and practice. The authors disclaim any intention of competing with the many excellent works dealing with the theoretical aspects of public health, but we feel convinced that they have gone far towards rendering more than one well-known standard text-book superfluous. The subject matter treated covers the usual ground, but it is the very practical manner in which it is handled that gives this book its charm: each section is made to stand by itself, and under each sub-division are practical suggestions as to the state of the law and the usual methods of administration to be followed by the health officer to secure the greatest good effect under that law. It will be readily understood that a book of this nature offers unusual difficulties to the reviewer, but so far as our examination of the work goes, we would call special attention to the completeness of the sections dealing with dairies, cowsheds, and milkshops; also infectious diseases and their prevention; that on sewage purification; also that on factories and workshops. All the other sections are good, but perhaps unequal.

As might be expected, a work of this nature is not free from errors or omissions. The following points have attracted our attention. In sec. 1, dealing with Administration, mention is made of the Commissioners of Sewers as acting in the City of London; surely this authority has ceased to exist! In Sec. 6 (Nuisances) an amplification might be made of references to Sections dealing with nuisances. In Sec. 29, which deals with Housing, the new Revenue Act, 1903 (Sec. 11) is omitted; so also in Sec. 30 (Tents and Vans) there are notable omissions of certain Acts dealing with this matter. The next section (31), on by-laws is not very clear as to which by-laws are applicable to rural and which to urban districts, nor as to which are compulsory and which are permissive. There is also some ambiguity, when speaking of London, as to the distinction between by-laws which are made by the County Council for the whole of London and those which are made by the different metropolitan sanitary authorities. In calling attention to these omissions, we recognise the difficulty in preparing a perfect or faultless work of this kind. The book is certainly a credit both to its authors and to its publishers, and is likely to obtain popularity among a wide circle of readers. R. H. F.

PLANNING OF POOR LAW BUILDINGS, ETC.†

This treatise would appear to be the outcome of the author's experience in connection with the design and construction of one or more large and well-planned institutions, parts of which are illustrated. Such experience is always interesting and useful to others; but it does not necessarily provide sufficient material and insight to deal with so large a subject as "The Planning of Poor Law Buildings," and there is much evidence throughout the book of lack of

* Sanitary Law and Practice. By W. Robertson, M.D., and C. Porter, M.D. 756 pp., 8vo. Price 10s. 6d. net. The Sanitary Publishing Co. London, 1905.

† The Planning of Poor Law Buildings and Mortuaries, by Albert C. Freeman. 69 pp., 4to. Price 7s. 6d. The St. Bride's Press, Ltd. London, 1904.

knowledge of established principles and the manner in which they have been applied in other buildings.

In the first chapter, which is labelled "Preliminary," and is in the nature of a general survey of the subject, the author laments the short-sightedness of Boards of Guardians in refusing to look beyond immediate requirements in buildings. It is by no means universal (indeed, nowadays, it is the exception), nevertheless it is worth while to emphasize the importance of the better course.

The observations on means of escape in case of fire are not very clear; and so far as they are clear they are not altogether to be commended.

The question of cost is dealt with in a perfunctory and misleading manner. There is a wide difference between the cost of a workhouse and that of an infirmary.

Chapter II. is devoted to what the author, with unconscious humour, calls "casual and vagrant buildings." This is followed by a paragraph of jejune observations upon the treatment of vagrants which would surprise an experienced guardian.

Details of these buildings are dealt with at length and, with some exception, correctly. The reference to automatic-seat-flushing water-closet apparatus in connection with separate cells is, however, so phrased as to give the idea that there is such an apparatus provided in each cell; which is certainly not the case.

Some confusion is caused in chapter III. by the attempt to deal with workhouses and infirmaries together. There is, or should be, sufficient difference between the two to warrant separate descriptions.

A good plan of a receiving ward block is shown on page 20, but it lacks the usual small rooms for searching new cases. These rooms need not be more than half the area suggested.

In spite of these and other errors the chapter deals in a fairly comprehensive manner with the details of an administrative block.

Chapter IV. describes the accommodation necessary for able-bodied inmates. The author states his personal objection to wards (or, rather, dormitories) with four rows of beds, but omits to mention the fact (which is so much more important) that the Local Government Board will not now sanction their erection. Whether the Board is well advised in the matter is perhaps a question of opinion.

In chapter V., which deals with accommodation for aged and infirm inmates and also married couples, some good plans are given in this chapter; and also in chapter VII., which is devoted to sick, isolation, and lying-in wards, but there is want of proper sequence and clearness of expression.

In treating of cottage homes (chapter VIII.), the author is apparently more at home with his subject, although his ideas upon ventilation are quite original.

A somewhat novel method is described for using the day-room fireplaces for supplying heated air to the dormitories above by flues, but these flues can scarcely convey "radiant heat" as suggested by the author.

The last chapter (XI.) describes "Public and Hospital Mortuaries." The subject of public mortuaries is dealt with in an inadequate manner, and the reason for its inclusion is not obvious.

A work upon the subject of poor-law buildings will certainly be of much use and interest at the present time, and indeed has been needed for many years; and in default of a better and more comprehensive treatise this book will be of service to an architect called upon to design a workhouse or infirmary for the first time; but, if there is any likelihood of the issue of a new edition, the author would do well in the meantime to make himself thoroughly acquainted with the papers issued by the Local Government Board upon the subject. A. S. S.

Calendar, April to May, 1905.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesday in each Month at 5 p.m.

Exhibition Committee . . Congress and Editing Committee	Monday in the week preceding the Council, at 4.30 p.m. & 5.30 p.m.
Examination Committee . . Museum and Library Committee	Tuesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Special Purposes Committee . Finance Committee . . .	Wednesday in the week preceding the Council, at 4 p m. and 5 p.m.
Parliamentary Committee . . New Premises Committee . . Disinfectant Standardisation Committee	As occasion requires.

The Parkes Museum is open free, on Mondays 9.30 a.m. to 8 p.m., other days 9.30 a.m. to 5.30 p.m. The Library and Office are closed at 1 p.m. on Saturdays.

Council and Committee Meetings are suspended during August and September, and the Museum and Library are closed on Public Holidays.

APRIL.

1 S. Inspection and Demonstration at Morden Hall Dairy Farm, Morden, Surrey, at 3 p.m. Conducted by Oscar J. White.

1 S. Demonstration—Meat Inspectors' Course at 2 p.m

3 M. Lecture to Sanitary Officers at 7 p.m. Water Supply, Sources of Supply and Distribution, by J. E. Worth, M.INST.C.E.

5 W. Inspection and Demonstration in the District of Islington, at 2 p.m. (number limited). Conducted by James R. Leggatt, Superintendent Public Health Department, Borough of Islington.

5 W. Lecture to Sanitary Officers at 7 p.m. Sewerage, by J. E. Worth, M.INST.C.E.

7 F. Lecture to School Teachers at Bedford College at 4.45 p.m., by W. H. Willcox.

7 F. Lecture to Sanitary Officers at 7 p.m. Sewage Disposal, by J. E. Worth, M.INST.C.E.

7 F. Demonstration—Meat Inspectors' Course at 6.30 p.m.

8 S. **Sessional Meeting** at 11 p.m. Bristol. Discussion on "Isolation Hospitals," to be opened by D. S. Davies. M.D., D.P.H., and T. H. Yabbicom, M INST.C.E.

8 S. Inspection and Demonstration at the Sewage Outfall Works, Barking, at about 3 p.m. Conducted by J. E. Worth, M.INST.C.E., District Engineer, L.C.C.

10 M. Lecture to Sanitary Officers at 7 p.m. Scavenging: Disposal of House Refuse, by J. E. Worth, M.INST.C.E.

10 M., 11 T., 12 W., 14 F. Lectures on Meat Inspection to Commissioned Officers and Professional Men at 5.30 p.m., by James King, M.R.C.V.S.

12 W. Inspection and Demonstration at the East London Soap Works, Bow, at 3 p.m. Arranged by Messrs. E. Cook & Co., Ltd.

12 W. Lecture to Sanitary Officers at 7 p.m. Signs of Health and Disease in Animals destined for Food, when alive and after slaughter. Tuberculin and other Tests, by W. Hunting, F.R.C.V.S.

13 Th. Lecture to Sanitary Officers at 7 p.m. Diseased Meat, with a Demonstration of Morbid Specimens collected from Meat Markets, by James King, M.R.C.V.S., Veterinary Inspector, Metropolitan Cattle Market.

14 F. Lecture to School Teachers at Bedford College at 4.45 p.m., by W. H. Willcox.

14 F. Lecture to Sanitary Officers at 7 p.m. The Names and Situations of the Organs of the Body in Animals, by W. Hunting, F.R.C.V.S.

14 F.
15 S. } Examination in Practical Sanitary Science as applied to Building and Public Works, and for Inspectors of Nuisances, Liverpool.

15 S. **Sessional Meeting** at 11 a.m. Liverpool. Discussion on "Recent Methods of Rehousing Tenants Dispossessed from Insanitary Property," to be opened by Fletcher T. Turton, Deputy Surveyor, Corporation of Liverpool.

15 S. Demonstration—Meat Inspectors' Course at 2 p.m.

17 M. Lecture to Sanitary Officers at 7 p.m. Practical Methods of Stalling and Slaughtering Animals by W. Hunting, F.R.C.V.S.

17 M. Lecture to Commissioned Officers and Professional Men at 5 p.m., on Tinned and Potted Foods, by Prof. H. R. Kenwood, M.B., D.P.H.

18 T. Lecture to Commissioned Officers and Professional Men at 5 p.m. Milk, Butter, and Cheese, by Prof. H. R. Kenwood, M.B., D.P.H.

19 W. Inspection and Demonstration at Harrison & Barber's Knacker Yard, Winthorp Street, Whitechapel, E., at 3 p.m. Conducted by R. Glover, F.R.C.V.S.

21 F. *Good Friday*
24 M. *Easter Monday* } Library and Museum Closed.

26 W. Lecture to Sanitary Officers at 7 p.m. The Appearance and Character of Fresh Meat, Organs, Fat, Blood, Fish, Poultry, Milk, Fruit, Vegetables, and other food, and the conditions rendering them, or preparations of them, fit or unfit for human consumption. Preserving and Storing Meat and other Foods, by E. Petronell Manby, B.A., M.D., D.P.H.

27 Th. Lecture to Sanitary Officers at 7 p.m. The Hygiene of Byres, Lairs, Cowsheds, and Slaughter-houses, and all places where animals destined for the supply of food are kept, and the Hygiene of Markets, Dairies, and other places where food is stored, prepared, or exposed for sale, and transported, by E. Petronell Manby, B.A., M.D., D.P.H.

27 Th. Lecture to Commissioned Officers and Professional Men at 5 p.m. Fish, Eggs, Tea, Coffee, Cocoa and Chocolate, Lime Juice, by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

28. F. Lecture to Commissioned Officers and Professional Men at 5 p.m. Wheat, Rice, Arrowroot, and other grains, Potatoes, Flour, Bread, Biscuits, Sugars, by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

28. F. Lecture to Sanitary Officers at 7 p.m. The Laws, By-Laws and Regulations affecting the inspection and sale of Meat and other articles of Food, including their preparation and adulteration, by E. Petronell Manby, B.A., M.D., D.P.H.

28 F. Demonstration—Meat Inspectors' Course at 6.30 p.m.

28 F. Lecture to School Teachers at Bedford College at 4.45 p.m., by W. H. Willcox.

29 S. Demonstration on Meat Inspection to Commissioned Officers and Professional Men at Metropolitan Cattle Market at 3 p.m., by James King, M.R.C.V.S.

MAY.

1 M. Lecture to Commissioned Officers and Professional Men at 5 p.m. Succulent Vegetables and Fruits, Jams. The Condiments: Vinegar, Pepper, Mustard, Prepared, Concentrated, and Preserved Foods, by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

SUPPLEMENT.

2 T. Lecture to Commissioned Officers and Professional Men at 5 p.m. Alcoholic Beverages: Beer, Wines, Whisky, Brandy, etc., by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

3 W. Visit to Factory for preparation of Concentrated and Preserved Foods.

4 Th. Demonstration on Meat Inspection to Commissioned Officers and Professional Men at Metropolitan Cattle Market at 3 p.m., by James King, M.R.C.V.S.

5 F. Lecture to School Teachers at Bedford College at 4.45 p.m., by W. H. Willcox.

5 F.
6 S. } Examination in Practical Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, London.

6 S. Demonstration—Meat Inspectors' Course at 2 p.m.

6 S. **Sessional Meeting** at 5 p.m., London. Discussion on "Housing in Mansions let in Flats," to be opened by Louis C. Parkes, M.D., D.P.H.

12 F. Lecture to School Teachers at Bedford College at 4.45 p.m., by W. H. Willcox.

12 F. **Institute Dinner at Princes' Restaurant,** at 7 p.m. HIS GRACE THE DUKE OF NORTHUMBERLAND in the Chair.

12 F.
13 S. } Examination for Inspectors of Meat and other Foods, London.

19 F.
20 S. } Examination in Practical Sanitary Science as applied to Building and Public Works, and for Inspectors of Nuisances, and in Hygiene in its bearing on School Life, Edinburgh.

26 F. Lecture to School Teachers in the Parkes Museum at 5 p.m., by Prof. H. R. Kenwood, M.B., D.P.H.

27 S. **Sessional Meeting** at 11 a.m., Birmingham.

EXHIBITION OF SCHOOL BUILDING AND FURNISHING APPLIANCES.

LONDON, 1905.

LIST OF AWARDS.

SILVER MEDAL.

W. Cassels.
Clarifont Lavatory.

Chaddock Window and Bulkhead Door Syndicate.
Chaddock Window Fittings.

BRONZE MEDAL.

Acme Flooring and Paving Co.
Rift Sawn Acme Immovable Flooring.

Adamsez, Ltd.
Fireclay Urinal with Back and Division in One Piece.

Bennet Furnishing Co., Ltd.
Dual Desk with separate Seats.

Bratt, Colbran & Co.
"Heaped Fire."

Cunningham Patent Window Co.
Cunningham Window Fittings.

Doulton & Co., Ltd.
Enamelled Fireclay Bath for Children.

Dowie & Marshall.
Properly-shaped Boots and Shoes.

Ellkay Patent Bath Syndicate.
Ellkay Bath.

The England Works.
All-metal Cloak-room Fittings.

Hammer, G. M. & Co., Ltd.
Folding Examination Desk and Table.
Seats and Desks.

G. E. Hawes.
Special Protected Hinge as applied to School Furniture.

Illingworth & Ingham.
School Seat with Adjustable Lumber Support on Curved Iron Standard.

Limmer Asphalte Paving Co.
Vertical Asphalte Plates for damp Walls.

SUPPLEMENT.

MAGAZINE HOLDER CO.
Scholar's Stand.

MINIMAX SYNDICATE, LTD.
Minimax Fire Extinguisher.

T. J. SYER.
Hand and Eye Training Apparatus.

W. S. THOMSON & CO.
Seats and Desks.
Dustless Brush.

DEFERRED FOR FURTHER TRIAL.

ADAMSEZ, LTD.
Hot and Cold Mixing Valve.

J. PERCY DAY.
Euboeolith Flooring.

DUST ALLAYER CO.
Florigene.

EDUCATIONAL SUPPLY ASSOCIATION.
Charts and Books.

JOHN JONES.
Pedestal Closet, with Gravitation Water Supply.

LIMMER ASPHALTE PAVING CO.
Lithofalt Concrete.

NEWTON CHAMBERS & CO.
Liquid Soap.

J. TYLOR & SONS, LTD.
China-lined Lead "P" Trap.

MEDALS AWARDED SINCE THE GLASGOW EXHIBITION, 1904.

JULY TO AUGUST.

BRONZE MEDALS.

CAMWAL, LTD.
Fontalis (Alkaline) Water *(deferred from Bradford Exhibition, 1903).*

DOULTON & CO.
Mixing Valve for Hot and Cold Water *(deferred from Glasgow Exhibition, 1904).*

WILSKEMP, LTD.
Fuel Economiser *(deferred from Glasgow Exhibition, 1904).*

BRONZE MEDAL RE-AFFIRMED.

BROOKES, LTD.
Hard York Non-Slip Stone *(Glasgow Exhibition, 1904).*

THE ROYAL SANITARY INSTITUTE.

REVIEWS OF BOOKS.

THE SEWAGE PROBLEM.*

The author has put into a convenient form for reference some of the principal evidence on practical points which has been obtained by the Royal Commission on Sewage Disposal. Those who have to wade through the four Reports that have been issued by the Commissioners, and the mass of evidence that they collected, together with the reports made by their officers, will appreciate any effort to bring into line the information which is distributed through the fourteen volumes of their proceedings, but which it is not easy to utilise. It is nearly seven years since the Commission was appointed, and at present there is no prospect of any Report that would summarise in a definite manner the conclusions which can be deduced from their labours. As yet those who are engaged in advising on sewage matters will have to apply the information which has been obtained by the Commissioners according to the circumstances of each case, and in doing this the author's book will at times be serviceable.

H. R.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
Hygiene of Special Classes, Trades, and Professions; and Municipal Administration.
Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

The articles referred to in this list are as far as possible collected and filed in the Library of the Institute for the use of the Members and Associates.

Science in relation to Hygiene and Preventive Medicine.

BEACH, FLETCHER, M.B., F.R.C.P. The Diagnosis and Treatment of Feeble-minded Children, with Remarks on Prognosis. *Journal of State Medicine*, March, 1905, p. 136.

MCFADYEAN, Prof. J., M.B., B.Sc., M.R.C.V.S. Glanders. *Journal of State Medicine*, March, 1905, p. 125.
Being the third Harben Lecture for 1904.

* The Sewage Problem. By Arthur J. Martin, A.M.Inst.C.E. 363 pp., 8vo. Price 8s. 6d. net. The Sanitary Publishing Co. London, 1905.

Hygiene of Special Classes, Trades, and Professions: and Municipal Administration.

GREENWOOD, ALFRED, M.D. Suggestions for improvements in the Sanitation of Schools. *Surveyor*, Aug. 26th, 1904, p. 232.

Sanitary conditions of Blackburn Schools, and recommendations as to playgrounds, refuse, heating, lighting accommodation, and ventilation.

SIMPSON, J. HARVEY. Cremation in Manchester and elsewhere. *Surveyor*, Oct. 14th, 1904, pp. 448–9.

Reasons for the adoption of cremation; objections against; requirements under Acts of Parliament; the sanitary argument; the land question; description of an ideal crematorium.

SYKES, J. F. J., M.D., B.Sc. Public Health and Architecture. Inaugural Address to Incorporated Society of Medical Officers of Health. *Public Health*, Dec. 1904, Vol. XVII., No. 3, p. 129.

Width of streets; rights to air; light and air for enclosed courts; ventilation; sunken open areas; aerial disconnection of w.c.'s, dwellings in flats, and sublet tenement houses.

Water Supply, Sewerage, and Refuse Disposal.

ALLIN, T. D. The Pasadena, Cal., Sewer Farm. *Engineering Record*, Feb. 11th, 1905, p. 154.

Description of a 300-acre sewer farm.

"ENGINEERING RECORD." Legal Restrictions on the Use of Underground Water Supplies in New York. *Engineering Record*, Feb. 18th, 1905, p. 177.

Account of the action-at-law of Reisart *v.* City of New York and the decision on appeal.

——— A Private Irrigation System in Texas. *Engineering Record*, Feb. 18th, 1905, p. 190.

Detailed description of the construction of 5-feet diameter concrete steel siphon.

FULLER, GEORGE W. Sewage Disposal. *Engineering*. Nov. 4th, 1904, p. 601.

American methods of disposal by dilution, etc. (An abstract of a paper read before the International Engineering Congress at St. Louis.)

GIESELER, E. A. A new form of Filter Gallery at Nancy, France. *Engineering Record*, Feb. 11th, 1905, p. 148.

Illustrated description of filtering gallery constructed in the gravel parallel with the river, and supplied with suitable openings to collect the subsoil water, a sand trench capable of removal being interposed.

HAZEN, ALLEN. Purification of Domestic Water. *Engineering*, Oct. 21st, 1904, pp. 531–2.

Water purification in the United States; American progress and methods; inadequacy of sand filters; turbid waters; improvements on European filters; methods of operation.

MARTIN, A. J., A.M.Inst.C.E. Seaside Sewage Disposal. *Journal of State Medicine*, Feb., 1905, p. 79.

MAXWELL, W. H., A.M.Inst.C.E. The Conservation of Subterranean Water Supplies and the Bearing of Geology thereon. *Surveyor*, Aug. 19th, 1904, p. 209.

Kent and Sussex water supplies; value of records of past investigations; artificial increase in yield; general conditions determining the quantity of water from underground sources.

——— The Conservancy of Water Supplies. *Journal of State Medicine*, Feb., 1905, p. 87.

Heating, Lighting, and Ventilating.

CHURCHILL, CHAS. S., M.Am.Soc.C.E. The Ventilation of Tunnels. *Engineering*, Dec. 9, 1904, pp. 799–800.

Tunnels in which ventilation is improved by indirect means; tunnels ventilated by mechanical plants; details of method of ventilating tunnels of the Boston Transit Commission, etc.

"ENGINEERING RECORD," EDITOR OF THE. Air Purification in the Ventilating Plant of the City Hall, St. Louis. *Engineering Record*, Feb. 18th, 1905, p. 186.

Illustrated description of systems of purifying incoming air by passing it through a spray chamber.

HOWARD, K. S. The Mechanical Plant of Simmons College, Boston. *Engineering Record*, Feb. 11th, 1905, p. 161.

Description of the arrangements for heating, ventilating, and lighting.

MEETINGS HELD.—JANUARY TO APRIL, 1905.

SESSIONAL MEETINGS.

Newcastle-on-Tyne.—The meeting was held in the Council Chamber in the Town Hall, on Saturday, March 4th, 1905, when a discussion on "Aerial Dissemination of Smallpox Infection around Smallpox Hospitals" was opened by H. E. Armstrong, D.Hy. The chair was taken by Louis C. Parkes, M.D., M.R.C.S., D.P.H. A visit was made to the Isolation Hospital, where the members were entertained at tea by the Sanitary Committee.

London.—The meeting was held at the Parkes Museum, on Saturday, March 25th, 1905, when a discussion was opened by G. F. McCleary, B.A., M.B., D.P.H.Lond., on "Municipal Milk Depots and Milk Sterilisation." The chair was taken by Sir Shirley F. Murphy, M.R.C.S. A visit was made to the Battersea Municipal Milk Depot, Disinfecting Station, Public Mortuary, and Coroner's Court. The members were entertained at tea in the Town Hall by Dr. McCleary.

Bristol.—The meeting was held in the Civil Court, on Saturday, April 8th, 1905, when a discussion was opened on "Isolation Hospitals" by D. S. Davies, M.D., D.P.H., M.O.H., and T. H. Yabbicom, M.Inst.C.E. The chair was taken by W. Whitaker, B.A., F.R.S., F.G.S., Chairman of Council. A visit was made to the Ham Green Isolation Hospital for Infectious Diseases. The members were received by the Rt. Hon. the Lord Mayor, and entertained at tea at the Isolation Hospital by Dr. Colston Wintle, Chairman of the Sanitary Committee.

Liverpool.—The meeting was held in the Arts Theatre in the University, on Saturday, April 15th, 1905, when a discussion was opened on "Recent Methods of Rehousing Tenants Dispossessed from Insanitary Property," by Fletcher T. Turton, Deputy Surveyor of the Corporation of Liverpool. The chair was taken by Sir Francis Sharp Powell, Bart., M.P. A visit was made to the Hornby Street Area.

EXAMINATIONS.

From January to April the following Examinations were held:

Sanitary Science as applied to Buildings and Public Works.

February	24 and 25.	Plymouth.	4 Candidates;	1 Certificate granted.
March	10 and 11.	Birmingham.	5 ,,	2 ,, ,,
April	14 and 15.	Liverpool.	1 ,,	1 ,, ,,

Inspectors of Nuisances.

February	24 and 25.	Plymouth.	24 Candidates;	10 Certificates granted.
March	10 and 11.	Birmingham.	33 ,,	18 ,, ,,
April	14 and 15.	Liverpool.	45 ,,	22 ,, ,,

Inspectors of Meat and other Foods.

March	17 and 18.		6 Candidates;	2 Certificates granted.

Hygiene in its bearing on School Life.

February	17 and 18.	London.	4 Candidates;	2 Certificates granted.

CANDIDATES WHO HAVE RECEIVED CERTIFICATES, JAN.-MARCH, 1905.

Sanitary Science as applied to Buildings and Public Works.

1905, Mar. 11. *EVANS, AMOS.
1905, Feb. 25. HOOPER, LEONARD GEORGE.
1905, Mar. 11. HUGHES, WM. THOMAS.

Hygiene in its bearing on School Life.

1905, Feb. 18. FERARD, LAVINIA LOUISA.
1905, Feb. 18. †SHICKLE, MABEL G. M.

Inspectors of Nuisances.

1905, Feb. 25. ‡DORNOM, FRANCIS WILLIAM.
1905, Mar. 11. ‡DOWSON, JOSEPH DIXON.
1905, Mar. 11. ‡EVANS, DANIEL MORGAN.
1905, Mar. 11. ‡EVANS, JOHN.
1905, Feb. 25. ‡FULL, WILLIAM HENRY.
1905, Feb. 25. ‡GERRY, LOUIS HENRY CHARLES.
1905, Mar. 11. ‡HANN, LEONARD CARSE.
1905, Mar. 11. ‡HARRIS, ALFRED WILLIAM.

1905, Mar. 11. ‡HAYLEY, PERCY.
1905, Mar. 11. ‡HETHERINGTON, JOHN WASDALE.
1905, Feb. 25. ‡JUPE, WILLIAM HENRY.
1905, Feb. 25. KING, PERCY CHARLES.
1905, Feb. 25. ‡LAMB, ERNEST HERBERT,
1905, Feb. 25. *L* McINERNY, ELLEN MARIA ELIZABETH.
1905, Mar. 11. *L* MILLER, CLARA ROSA.
1905, Mar. 11. ‡NEAL, GEO. HENRY.
1905, Feb. 25. ‡NUGENT, EBENEZER.
1905, Mar. 11. ‡PARKER, SAMUEL RICHARD.
1905, Mar. 11. ROSS, JOHN.
1905, Mar. 11. ‡SHERMAN, JAMES JORDAN.
1905, Mar. 11. SIMCOCK, WILLIAM.
1905, Mar. 11. ‡SKITT, WILLIAM.
1905, Feb. 25. ‡SMITH, ALBERT FREDK. GEORGE.
1905, Mar. 11. ‡SOPER, EDMUND JAMES.
1905, Mar. 11. *L* SYKES, AMY.
1905, Mar. 11. *L* SYKES, MARION.
1905, Mar. 11. ‡THIRLWALL, HARRY.
1905, Feb. 25. WHITE, CHARLES.

Inspectors of Meat and Other Foods.

1905, Mar. 18. BINTCLIFFE, HAROLD.
1905, Mar. 18. ‡WALSH, CHRISTOPHER RALPH.

FORTHCOMING MEETINGS.

ANNUAL DINNER.

His Grace the Duke of Northumberland, K.G., President of the Institute, has consented to take the chair at the Annual Dinner of the Institute, which will be held on Friday, May 12th, at the Princes' Restaurant.

SESSIONAL MEETINGS.

The following arrangements have been made:—

London, May 8th. "Housing in Mansions let as Flats," by Dr. Louis C. Parkes and W. Rolfe (Architect).

Birmingham, May 27th. "Certain aspects of the Housing Problem," by Dr. J. Robertson. Visit to Rowton House and Bournville Estate.

London, June 16th. "Sanatoria: Design and Location," by Edwin T. Hall, F.R.I.B.A. Visit to a Sanatorium.

Cambridge, July 15th. "Distribution of Water Supply in County Areas," by Prof. Sims Woodhead. Visit to Waterworks and Wells in Cam Valley.

EXAMINATIONS.

In Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances under the Public Health Act, 1875:—London, May 5th and 6th; Edinburgh, May 19th & 20th.

Inspectors of Meat and Other Foods:—London, May 12th & 13th.

Hygiene in its bearing on School Life:—Edinburgh, May 19th & 20th.

CALENDAR, MAY TO JULY, 1905.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesday in each Month at 5 p.m.

Exhibition Committee . . Congress and Editing Committee	Monday in the week preceding the Council, at 4.30 p.m. & 5.30 p.m.
Examination Committee . . Museum and Library Committee	Tuesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Special Purposes Committee . Finance Committee . . .	Wednesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Parliamentary Committee . . New Premises Committee . . Disinfectant Standardisation Committee	As occasion requires.

The Parkes Museum is open free, on Mondays 9.30 a.m. to 8 p.m., other days 9.30 a.m. to 5.30 p.m. The Library and Office are closed at 1 p.m. on Saturdays.

Council and Committee Meetings are suspended during August and September, and the Museum and Library are closed on Public Holidays.

MAY.

1 M. Lecture to Commissioned Officers and Professional Men at 5 p.m. Succulent Vegetables and Fruits, Jams. The Condiments: Vinegar, Pepper, Mustard, Prepared, Concentrated, and Preserved Foods, by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

2 T. Lecture to Commissioned Officers and Professional Men at 5 p.m. Alcoholic Beverages: Beer, Wines, Whisky, Brandy, etc., by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

3 W. Visit to Factory for preparation of Concentrated and Preserved Foods.

4 Th. Demonstration on Meat Inspection to Commissioned Officers and Professional Men at Metropolitan Cattle Market at 3 p.m., by James King, M.R.C.V.S.

5 F. Lecture to School Teachers at Bedford College at 4.45 p.m., by W. H. Willcox.

5 F.
6 S. Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, London.

6 S. Demonstration—Meat Inspectors' Course at 2 p.m.

8 M. **Sessional Meeting** at 5 p.m., London. Discussion on "Housing in Mansions let in Flats," to be opened by Louis C. Parkes, M.D., D.P.H., and W. Rolfe (Architect).

12 F. Lecture to School Teachers at Bedford College at 4.45 p.m., by W. H. Willcox.

12 F. **Institute Dinner at Princes' Restaurant,** at 7 p.m. HIS GRACE THE DUKE OF NORTHUMBERLAND in the Chair.

12 F.
13 S. Examination for Inspectors of Meat and other Foods, London.

19 F.
20 S. Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, and in Hygiene in its bearing on School Life, Edinburgh.

26 F. Lecture to School Teachers in the Parkes Museum at 5 p.m., by Prof. H. R. Kenwood, M.B., D.P.H.

27 S. **Sessional Meeting** at 11 a.m., Birmingham. Discussion on "Certain Aspects of the Housing Problem," to be opened by J. Robertson, M.D., M.O.H.
Visit to a Rowton House and the Bournville Estate.

JUNE.

2 F. Lecture to School Teachers in the Parkes Museum, at 5 p.m., by Prof. H. R. Kenwood, M.B., D.P.H.

2 F.} 3 S.} Examination in Sanitary Science as applied to Building and Public Works, and for Inspectors of Nuisances, and in Hygiene in its bearing on School Life, Leeds.

9 F. Lecture to School Teachers in the Parkes Museum at 5 p.m., by J. Osborne Smith, F.R.I.B.A.

9 F.} 10 S.} Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Belfast.

16 F. Lecture to School Teachers in the Parkes Museum, at 5 p.m., by J. Osborne Smith, F.R.I.B.A.

16 F. **Sessional Meeting.** London. Discussion on "Sanatoria: Design and Location," opened by E. T. Hall, F.R.I.B.A.

17 S. Visit to a Sanatorium.

23 F. Lecture to School Teachers in the Parkes Museum, at 5 p.m., by J. Osborne Smith, F.R.I.B.A.

23 F.} 24 S.} Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Manchester.

30 F., and S., 1st July, Examination for Inspectors of Meat and other Foods, Manchester.

JULY.

7 F.} 8 S.} Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Norwich.

15 S. **Sessional Meeting** at 11 a.m. Cambridge. Discussion on "Distribution of Water Supply in County Areas," opened by Prof. Sims Woodhead, M.D., F.R.C.P., F.R.S.EDIN.

21 F.} 22 S.} Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Cardiff.

FELLOWS, MEMBERS, AND ASSOCIATES

ELECTED FROM JANUARY TO APRIL, 1905.

FELLOWS.

1667 1905. Feb. ANDERSON, Alfred Jasper, M.A., M.B., M.O.H., D.P.H., 4, *Church Square, Cape Town.*

1177 1905. Apr. BUTLER, William, M.B., C.M., D.P.H., 26, *Craven Park Road, Harlesden.*

123 1905. Feb. FAWCETT, William Milner, M.A.CANTAB., F.S.A., F.R.I.B.A., 4, *Trumpington Street, Cambridge.*

1746 1905. Apr. JAMES, Charles Carkeet, M. INST. C. E., *Municipal Offices, Bombay.*

1570 1905. Jan. KERR, James, M.A., M.D., D.P.H.CAMB., *Medical Officer (Education), London County Council, Victoria Embankment, W.C.*

1231 1905. Feb. RIGBY, Herbert Peter Barrow, M.INST.C.E., *Drainage Engineer, Cape Town, Cape Colony.*

1703 1905. Feb. SLATER, John, B.A.LOND., F.R.I.B.A., 46, *Berners Street, W.*

958 1905. Apr. WILLOUGHBY, W. G., M.D., D.P.H., *Town Hall, Eastbourne.*

1013 1905. Feb. WYNNE-ROBERTS, Robert Owen, M.INST.C.E., *Water Engineer, Cape Town.*

MEMBERS.

*** Passed Examination in Sanitary Science as applied to Buildings and Public Works.**
‡ Passed Examination for Sanitary Inspector.
M Marked thus have passed the Examination of the Institute for Inspectors of Meat and Other Foods.

1896 1905. Feb. BEACH, Henry William, M.R.C.S., L.R.C.P., D.P.H.CAMB., *Medical Officer of Health, Great Yarmouth, Norfolk.*

1922 1905. Apr. BIRCH, John E. W., 38, *Woodhouse Grove, East Ham.*

1905 1905. Mar. BRAITHWAITE, William, *Throstle Nest, Horsforth.*

1897 1905. Feb. BRADSHAW, Arthur Stanley, *Borough Engineer and Surveyor's Office, Town Hall, Bedford.*

1906 1905. Mar. BURGESS, Gregor, M.B., C.M., 14, *New Road, Driffield.*

1887 1905. Jan. BUTLAND, Richard John, *Brighthelmstone, Stanley Road, Lower Edmonton, N.*

1890 1905. Jan. *CATLEY, Ashley James, 19, *St. Mary's Butts, Reading.*

1891 1905. Jan. *COOPER, Launcelot A., 7, *Drayton Gardens, West Ealing.*

1910 1905. Mar. COX, Charles Leslie, *Engineer and Surveyor's Office, Town Hall, Gosport.*

1311 1905. Mar. DARUVALA, Dinslaw Dadabhoy, *The Municipality, Bombay.*

1898 1905. Feb. ‡DE CHAUMONT, Miss Nora T. F., 86, *Abingdon Rd., Kensington.*

1935 1905. Apr. *EVANS, Amos, *Park Lane, Bath.*

1892 1905. Jan. *EWING, James, 2, *Lloyd Street, W.C.*

1899 1905. Feb. M FORD, Major Reginald, A.S.C., D.S.O., *The Grange, Chobham, Surrey.*

1923 1905. Apr. HARRISON, John William, 2, *Ashley Street, Rock Ferry, Cheshire.*

1921 1905. Apr. HEWETSON, Capt. Henry, R.A.M.C., D.P.H., L.R.C.P., M.R.C.S., *Station Hospital, Western Heights, Dover, Kent.*

1893 1905. Jan. *HARTFREE, G. Bertram, *District Surveyor's Office, Camberley.*

1912 1905. Mar. KNOWLES, George Potter, ASSOC.M.INST.C.E., F.S.I., *L.C.C. Engineer's Department, County Hall, Spring Gardens, S.W.*

1900 1905. Feb. LITTLEJOHN, H. Harvey, B.SC., (PUB. HEALTH), M.A., M.B., C.M.EDIN., F.R.C.S.EDIN., F.R.S.E., 1, *Atholl Crescent, Edinburgh.*

1925 1905. Apr. LITTLER, Robert Barratt, M.R.C.V.S., 8, *Appleton Gate, Newark-on-Trent, Nottingham.*

1901 1905. Feb. MACFADYEN, Allan, M.D., B.SC., F.I.C., 14, *Daleham Gardens, Hampstead, N.W.*

1926 1905. Apr. MARTINDELL, H. E. W., *Chelston, Ashford, Middlesex.*

1927 1905. Apr. MCVAIL, John, M.D., M.B., C.M., D.P.H., F.R.S.E., 24, *George Square, Glasgow.*

1907 1905. Mar. MORGAN, W. Vincent, A.R.I.B.A., 24, *King Street, Carmarthen.*

1908 1905. Mar. MORRIS, Percy, A.R.I.B,A., *2, Heavitree Park, Exeter, Devon.*

1928 1905. Apr. MOSTYN, Sidney Gwenffrwd, M.A., M.R.C.S., L.R.C.P., M.B., D.P.H., M.O.H. *The Health Office, South Shields, Durham.*

1929 1905. Apr. NASH, Percy Allan, 26, *Mount Pleasant, Norwich, Norfolk.*

1913 1905. Mar. NASH, William James, A.R.I.B.A., *The Square, Neath, Glam.*

1930 1905. Apr. NASMYTH, Thomas Goodall, M.D., D.SC., D.P.H.CAMB., F.R.S.E., *St. Michael's, Cupar Fife, N.B.*

1914 1905. Mar. PINGSTONE, G. A., F.C.S., *Analyst, Buluwayo Municipal Council, Rhodesia, S. Africa.*

1931 1905. Apr. PLUMMER, George, 45, *Meredyth Road, Barnes, S.W.*

1894 1905. Jan. *POWELL, Arthur Ernest, 38, *Rectory Road, Stoke Newington, N.*

1932 1905. Apr. PRESTON, Henry, F.G.S., *Engineer to the Grantham Waterworks Co., Lincolnshire.*

1903 1905. Feb. RENNEY, Henry, M.D., M.B., B.S., D.P.H.UNI.DURH., M.O.H., "*Westbrook,*" *Burn Park Road, Sunderland.*

1933 1905. Apr. SCOBLE, Herbert Thomas, 28, *Victoria Street, Westminster, S.W.*

1915 1905. Mar. SHACKLETON, William, ASSOC.M.INST.C.E., 26, *Harding Road, Hanley, Staffs.*

1916 1905. Mar. [S] SHICKLE, Miss Mabel G. M., *Sion House, Bath.*

1904 1905. Feb. ‡SIMMONS, Thomas Burtham, *Engineer and Surveyor, Malden and Coombe Urban District Council,* "*Brenton,*" *Line Grove, New Malden, Surrey.*

1909 1905. Mar. SMITHSON, Arthur Ernest, B.A., M.B.BC., M.R.C.S., L.R.C.P., D.P.H., MAJOR R.A.M.C., *c/o Sir C. R. McGrigor, Bart., & Co., 25, Charles Street, St. James Sq., S.W.*

1917 1905. Mar. SNAPE, Alfred Ernest, B.SC.VICT., *Engineer's Dept., London County Council, W.C.*

1918 1905. Mar. STAINTHORPE, Thomas William, ASSOC.M.INST.C.E., *Assistant Engineer, Public Works Department, Cape Town.*

1895 1905. Jan. *STEVENSON, George Henry, *Building Surveyor, Shifnal, Salop.*

1919 1905. Mar. SUMNER, Frank, M.INST C.E., *Borough Engineer and Surveyor, Town Hall, Woolwich.*

1920 1905. Mar. SUMNER, J., *Box 5229, Johannesburg, South Africa.*

1934 1905. Apr. THOMAS, Richard Wellings, *Llandrindod Wells, Radnor.*

1921 1905. Mar. TREMELLING, Hubert, ASSOC. M. INST. C. E., *Borough Engineer's Dept., Town Hall, Newport, Mon.*

1888 1905. Jan. TURNER, John Andrew, M.B., C.M., D.P.H., *Executive Health Officer, Health Dept., Bombay, India.*

1887 1905. Jan. VAREY, James Arthur, *West Hill House, Chapel Allerton, Leeds, Yorks.*

ASSOCIATES.

‡ Passed Examination for Inspectors of Nuisances.
M **Passed Examination for Inspectors of Meat and Other Foods.**
S **Passed Examination in Practical Hygiene for School Teachers.**

3172 1905. Mar. ‡Almond, William, *Rural District Council Offices, Maldon, Essex.*

3112 1905. Jan. ‡Anderson, Herbert, 28, *Seaborn Road, Newlands, Morecambe.*

3168 1894. May. ‡Atkinson, G. C., *Herne Villa*, 22, *Clifton Villas, Camden Square, N.W.*

3113 1905. Jan. ‡Baldwin, Ernest Wilfred, 35, *Kingswood Road, Wimbledon.*

3151 1905. Feb. Bideleux, Miss Hilda, 114, *North Side, Clapham Common, S.W.*

3114 1905. Jan. ‡Boswell, Thomas Mant, 9, *Woodbreigh Villas, Burleigh Road, Enfield, N.*

3185 1905. Apr. ‡Boys, Henry, 50, *Walsingham Street, Walsall.*

3115 1905. Jan. ‡Bradbury, William James, 95, *Spring Bank Street, Stalybridge.*

3116 1905. Jan. ‡Brewer, Herbert John, *Haslemere, Brintons Terrace, Southampton.*

3186 1905. Apr. ‡Bulmer, George Frederick, *Rosehill, Great Ayton R.S.O., Yorks.*

3173 1905. Mar. ‡Butler, Richard Heber, 42, *Slade Grove, Longsight, Manchester.*

3518 1903. Nov. Byrne, Miss Catherine Widdington, 35, *Lansdown Road, Paddington, W.*

3117 1905. Jan. ‡Caffyn, Harry, *Hanstreet, Colestone, Kent,*

3174 1905. Mar. ‡Carter, Harry, 57, *Blackman Lane, Leeds.*

3152 1905. Feb. ‡Chart, Robert, Junr., *The Limes, Mitcham.*

3181 1901. May. ‡Christie, G., *Public Health Dept.*, 31-41, *Municipal Buildings, Johannesburg.*

3118 1905. Jan. ‡Clark, Alexander, *Kendrick, Tamworth Park, Commonside East, Mitcham.*

3119 1905. Jan. ‡Cobbett, Arthur William, 17, *Martindale Road, Balham, S.W.*

3120 1905. Jan. ‡Coe, John Cyril, 46, *Tuam Road, Plumstead, S.E.*

3121 1905. Jan. ‡Constantine, Mrs. Annie Eliza, 168, *Musters Rd., West Bridgeford, Nottingham.*

3122 1905. Jan. ‡Cooper, Miss Mary Eliza, 88, *Axe Street, Barking, Essex.*

3153 1905. Feb. ‡Cousins, Charles William, 233, *Walkley Road, Sheffield.*

3154 1905. Feb. ‡Cowen, Miss Hetty, 22, *Regent's Park Terrace, N.W.*

3155 1905. Feb. ‡Cunynghame, Miss Anna B. de M., 2, *Lincoln St., Chelsea, S.W.*

3123 1905. Jan. ‡Davis, Miss Gertrude, 7, *Ryecroft Road, Lewisham, S.E.*

3187 1905. Apr. ‡Dornom, Francis William, 72, *Fore Street, Salcombe, Devon.*

3424 1905. Jan. ‡**Dowdell**, Arthur, 76, *Durham Road, Spennymoor, Durham.*

3488 1905. Apr. ‡**Dowson**, Joseph Dixon, *The Villas, Witton Part. R.S.O., Durham.*

3483 1905. Apr. **Draper**, Joseph, *Council House, Handsworth, Birmingham.*

3490 1905. Apr. ‡**Eccles**, William Henry, *Portwood Stables, Stockport, Cheshire.*

3425 1905. Jan. ‡**Emerton**, William John, 118, *Farley Road, Catford, S.E.*

3491 1905. Apr. ‡**Evans**, Daniel Morgan, 15, *Wood Street, Mardy, Glam.*

3426 1905. Jan. ‡**Evans**, Ernest William, 16, *Ivy Street, Penarth, Glamorgan.*

3492 1905. Apr. ‡**Evans**, John, *Tygwyn, Tregaron, Cardigan.*

3427 1905. Jan. ‡**Fearn**, George Hargreave, *Arkesden, near Newport, Essex.*

3456 1905. Feb. **Ferard**, Miss Lavinia Louisa, 54, *Burton St., Lower Sloane Street, Chelsea, S.W.*

3489 1905. Apr. ‡**Full**, William Henry, 45, *High St., Totnes, Devon.*

3433 1903. Jan. ‡**Firth**, C., *Moorville, Drighlington, Bradford.*

3457 1905. Feb. ‡**Gallaher**, Miss Frances M., *Fenixowles Vicarage, Blackburn, Lancs.*

3428 1905. Jan. ‡**Garwood**, George Clarke, *West District Road, Ashford.*

3493 1905. Apr. **Gaul**, Miss Kate Emily, 50, *Chevening Rd., Kensal Rise, W.*

3494 1905. Apr. ‡**Gerry**, Louis Henry Charles, 2, *Tavistock Place, Plymouth.*

3429 1905. Jan. ‡**Grant**, Albert Isaac, *c/o Mr. Dadswell, Framfield Road, Uckfield, Sussex.*

3495 1905. Apr. ‡**Hann**, Leonard Carse, *Rossiter Cottage, Henrietta Park, Bath.*

3496 1905. Apr. ‡**Harris**, Alfred William, 15, *Court Road, Balsall Heath, Birmingham.*

3497 1905. Apr. ‡**Hayley**, Percy, 34, *Mount Pleasant, Wakefield.*

3430 1905. Jan. ‡**Hepworth**, Evelyn, 4, *Mornington Terrace, North End, Portsmouth.*

3498 1905. Apr. ‡**Hetherington**, John Wasdale, *Beckbottom, Westward, Wigton, Cumberland.*

3458 1905. Feb. ‡**Hewett**, Henry Samuel, 60, *St. Albans Road, Dartford, Kent.*

3475 1905. Mar. ‡**Hockley**, Charles, *Council Offices, Barry, Glam.*

3459 1905. Feb. ‡**Holroyd**, James Bates, *Surveyor and Sanitary Inspector, Mells, near Frome, Somerset.*

3476 1905. Mar. ‡**Hooper**, James Charles, 20, *Brookdown Terrace, St. Stephen's, Saltash, Cornwall.*

3477 1905. Mar. ‡**Hopkins**, William John, 73, *Kingsland Crescent, Barry, Glam.*

3431 1905. Jan. ‡**Hudson**, Thomas W., "*Bayonne,*" *Laurence Street, Mill Hill, N.W.*

3132 1905. Jan. ‡HUGHES, James Ernest, 15, *Deacon Road, Widnes, Lancs.*
3133 1905, Jan. ‡HUNT, Henry Reginald, 12, *Pretoria Terrace, Beaconsfield Road, Southall.*
3134 1905. Jan. ‡HUNTER, Edward John, *Haltwhistle, Northumberland.*
3498 1905. Apr. JOHNSON, William, 121, *Dyers Hall Rd., Leytonstone.*
3135 1905. Jan. JONES, Richard Henry, 5, *Waterloo Road, Chester.*
3136 1905. Jan. ‡JORDAN, Miss Agnes Mahalia, *Park Corner, Great Dunmow, Essex.*
3499 1905. Apr. ‡JUPE, William Henry, "*Dulce Domum,*" *Whittington Street, Devonport.*
3137 1905. Jan. ‡KIRKUS, Miss Winifred, 18, *Sunnybank, Hymers Avenue, Kingston-upon-Hull.*
3500 1905. Apr. ‡LAMB, Ernest Herbert, 34, *Alexandra Road, Plymouth.*
3460 1905. Feb. ‡LETHBRIDGE, Miss Amelia, 53, *Oxford St., Swansea, Glam.*
3180 1899. Mar. ‡LITTLETON, F., *P.O. Box* 5762, *Johannesburg.*
3470 1905. Mar. LONG, Miss Kaye Louise, 6, *Rockland Road, Putney, S.W.*
3501 1905. Apr. ‡MARGISON, Walter, 44, *Albert Street, Nelson.*
3138 1905. Jan. ‡MATHISON, Joseph, *Mill House, Pulborough, Sussex.*
3139 1905. Jan. ‡MOODY, Henry, *Station Road, Hetton-Le-Hole, Durham.*
3502 1905. Apr. MORGAN, Thomas F. A., 44, *Clayton Road, Peckham, S.E.*
3140 1905. Jan. ‡MORLEY, William Henry, 137, *Gerard St., Derby.*
3503 1905. Apr. ‡NEAL, George Henry, 54, *Chiswell Road, Birmingham.*
3461 1905. Feb. ‡NEWTON, Miss Mabel Fortescue, 36, *Castlewood Rd., Stamford Hill, N.*
3504 1905. Apr. ‡NOTT, Samuel Francis, 52, *Brown Street, Rotherham.*
3505 1905. Apr. ‡NUGENT, Ebenezer, 21, *Ryde Vale Road, Balham, S.W.*
3141 1905. Jan. M‡NUTTALL, Ellis, 11, *Empress Street, Old Trafford, Stretford, Lancs.*
3462 1905. Feb. ‡PACKWOOD, George Henry, *Camelford, Cornwall.*
3463 1905. Feb. ‡PARGETER, Thomas, Junr., 492, *Holloway Road, London, E.*
3506 1905. Apr. ‡PARKER, Samuel Richard, *Mill Street, Ruiton, near Dudley.*
3464 1905. Feb. PARR, Joseph E., *Assistant Engineer and Surveyor, Council House, Handsworth, Staffs.*
3507 1905. Apr. ‡PILCH, John, 73, *Glebe Road, Norwich, Norfolk.*
3169 1898. July. ‡QUELCH, A. S., *Castle Rock*, 7, *Overton Terrace, Norwich Avenue, Bournemouth.*
3508 1905. Apr. ‡RAWSON, Samuel, 93, *Arundel Road, Great Yarmouth.*
3142 1905. Jan. ‡RICHMOND, Walter, 22, *Waterloo Road, Runcorn, Cheshire,*

3509 1905. Apr. ‡SCOTT, George Vickers, 3, *Hawthorn Terrace, Dunston-on-Tyne, Durham.*

3510 1905. Apr. ‡SHERMAN, James Jordan, *Berwood Farm, Chester Road, Erdington.*

3443 1905. Jan. ‡SILLS, Edwin Howard, 49, *Angerstein Road. Landport, Hampshire.*

3511 1905. Apr. ‡SKITT, William, 72, *West Terrace, Silverdale, Stafford.*

3465 1905. Feb. ‡SMALL, Leonard John, *Assistant Surveyor, Council Offices, Broadstairs, Kent.*

3512 1905. Apr. ‡SMITH, Albert Frederick George, 11, *Morice Square, Devonport.*

3466 1905. Feb. ‡SMITH, George, 10, *Belvedere Cottages, Church Road, Wimbledon.*

3513 1905. Apr. ‡SMITH, Willie, 29, *Altofts Place, Leeds.*

3514 1905. Apr. ‡SOPER, Edmund James, 26, *Temple Road, Larkbeare, Exeter.*

3515 1905. Apr. ‡STEWARDSON, John, 49, *Market Street, Dalton-in-Furness, Lancs.*

3517 1897. Nov. ‡STEWART, Robert Tomlinson, *Town Hall Chambers, Feltham, Middlesex.*

3516 1905. Apr. ‡THIRLWALL, Harry, 58, *Cleveland Street, Doncaster.*

3476 1905. Mar. ‡TURTON, John, *Fern Lea, Wolverhampton Road, Cannock, Stafford.*

3444 1905. Jan. ‡TYREMAN, Isaac, 3, *Park Cottages, Linthorpe, Middlesbrough.*

3445 1905. Jan. ‡VENABLES, Frederick William, 48, *Balham Road, Lower Edmonton.*

3446 1905. Jan. ‡WATERS, Hugh William, 9, *Merlin Road, Wanstead Park, E.*

3447 1905. Jan. ‡WEST, Clement, *Bloomfield, Central Hill, Upper Norwood, S.E.*

3448 1905. Jan. ‡WHEELER, Alfred George, *Surveyor's Office, Midsomer Norton.*

3471 1905. Mar. WHITWORTH, Miss Irene, B.SC., 36, *Mount Pleasant Road, Lewisham, S.E.*

3449 1905. Jan. ‡WILLIAMS, John Richard, *East Hill, Oxted, Surrey.*

3477 1905. Mar. ‡WILLIAMS, William Gladstone, 17, *Alder Road, Balsall Heath, Birmingham.*

3467 1905. Feb. ‡WILLIAMSON, William Parker, 62, *Blythe Vale, Catford.*

3450 1905. Jan. ‡WYETH, George Knapp, 47, *Montpelier Vale, Blackheath, S.E.*

CONTRIBUTIONS AND ADDITIONS TO LIBRARY.

*** *For publications of Societies and Institutions, etc., see under "Academies."*

ACADEMIES (American).

Philadelphia. *Henry Phipps' Institute.* First Annual Report. A brief account of the work of the first year, and a reprint of the Lectures delivered under the auspices of the Institute. 265 pp., 8vo. Philadelphia, 1905. *The Institute.*

ACADEMIES (British).

London. *Association of Municipal and County Engineers.* Proceedings of, Vol. XXX., with index to Vols. I.-XXX., 1903-1904. 674 pp., 8vo. London, 1904. *The Association.*

——— *Childhood Society.* Transactions for the Year 1903. Vol. II., Part II. 64 pp., 8vo. London, 1905. *The Society.*

——— *Civil and Mechanical Engineers' Society.* Transactions for Forty-fifth Session, 1903-4. 56 pp. (Plates), 8vo. London, 1904. *The Society.*

——— *Royal Institution of Great Britain.* Proceedings for the Year 1903. Vol. XVII., Part II.; List of Members 1904. 426 pp., 8vo. London, 1904. *The Institution.*

Allison, *T. M., M.D.* Health in Infancy. 41 pp., 8vo. Newcastle-on-Tyne, 1905. *T. & G. Allan (Publishers).*

Baker, *M. N., Ph.B., C.E.* British Sewage Works, and notes on the Sewage Farms of Paris, and on two German Works. 150 pp., 8vo. New York, 1904. *The Public Health Engineer.*

Bern. Statistisches Jahrbuch der Schweiz, Heransgegeben vom Statischen Bureau des Innern. Dreizehnter Jahrgang 1904. 366 pp., 8vo. Bern, 1905. *The Bureau.*

Ceylon. Architectural Remains, Anuradhapura, Ceylon. Comprising the Dógabas and certain other ancient ruined structures. Measured, drawn, and described by James G. Smither, F.R.I.B.A. Ceylon, 1904. *E. Mitchell.*

Collie, *A., M.D.* The Infectivity of Enteric Fever. 47 pp., 8vo. London, 1905. *J. Knight & Co. (Publishers).*

Dukes, *Clement, M.D., B.S.Lond.* Health at School, considered in its mental, moral, and physical aspects. Fourth Edition. 606 pp., 8vo. London, 1905. *The Author.*

Dundee. Report of Investigation into Social Conditions in Dundee. Part I. Medical Inspection of School Children. 48 pp., 8vo. Dundee, 1905. *Purchased.*

Finnemore, W. The Addison Temperance Reader; with Chapters on Thrift and Juvenile Smoking. 219 pp., 8vo. London, 1905. *The Addison Publishing Co.*

Geological Survey. The Water Supply of Lincolnshire from underground sources: with records of sinkings and borings, by H. B. Woodward, F.R.S.; with Contributions by W. Whitaker, B.A., F.R.S.; H. F. Parsons, M.D., F.G.S.; Hugh R. Mill, D.Sc., LL.D., and H. Preston, F.G.S. 230 pp., 8vo. London, 1904. *H. M.'s Government.*

Georgetown. Town Superintendent's Annual Report for 1904. 21 pp., fcp. Georgetown, 1905. *Luke M. Hill, M.Inst.C.E.*

Greenwich. Royal Observatory. Results of the Magnetical and Meteorological Observations made in the Year 1902, under the direction of W. H. M. Christie, C.B., M.A., F.R.S., Astronomer-Royal. 131 pp., 4to. Edinburgh, 1904. *The Astronomer-Royal.*

Griffiths, *H., A.R.I.B.A., Assoc.M.Inst.C.E.* The Plenum or Propulsion system of Heating and Ventilation. 107 pp., 8vo. London, 1905. *The Author.*

Haycraft, *J.B., M.D.* The Human Body: a Physiology Reader for Schools. 170 pp., 8vo. London, 1902. *The Author.*

Holden, *H.* Flat-foot or Splay-foot. Fourth Edition. 15 pp., 8vo. London, 1905. *Holden Bros. (Publishers).*

Keen, *F. N., Barrister-at-Law.* Urban Police and Sanitary Legislation, 1904. 240 pp., 8vo. London, 1905. *Messrs. P. S. King & Son.*

London County Council. Report of the Public Health Committee, submitting the Report of the Medical Officer of Health of the County for the year 1903. 138 pp., fcp. London, 1904.

——— Annual Report of the Technical Education Board, 1903–4. 80 pp., fcp. London, 1905.

——— The London Education Gazette, Supplement No. 1, March 27th, 1905. 70 pp., fcp. London, 1905. *The Clerk of the Council.*

London (County of). Electricity Supply Undertakings, 1903-04. 22 pp., fcp. London, 1905. *The Clerk of the Council.*

McCleary, *G. F., M.D., D.P.H.* Infantile Mortality and Infants' Milk Depots. 135 pp., 8vo. London, 1905. *The Publishers (P. S. King & Son).*

Martin, *A. J., Assoc.M.Inst.C.E.* The Sewage Problem. A Review of the evidence collected by the Royal Commission on Sewage Disposal. Price 8/6. 363 pp., 8vo. London, 1905. *The Author.*

Martin, *A. J., Assoc.M.Inst.C.E.* Seaside Sewage Disposal. Reprinted from the Journal of State Medicine, February, 1905. 8 pp., 8vo. London, 1905. *The Author.*

Massachusetts. Thirty-fifth Annual Report of the State Board of Health, 1903. 645 pp., 8vo. Boston, 1904. *The Board.*

Newsholme, *A., M.D., M.R.C.P.Lond.* The possible association of the Consumption of Alcohol with excessive mortality from Cancer. 7 pp., 8vo. London, 1904. *The Author.*

——— An Address on Social Evolution and Public Health (delivered at the Inaugural Meeting of the York Medical Society on October 21st, 1904). 25 pp., 8vo. London, 1904. *The Author.*

New Hampshire. Eighteenth Report of the State Board of Health, for two years ending November 1st, 1904. 270 pp., 8vo. Concord, 1904. *The Board.*

New South Wales. Report of the Board of Health on a Third Outbreak of Plague at Sydney, 1903. 15 pp., fcp. Sydney, 1904. *J. Ashburton Thompson, M.D., D.P.H.*

Nottingham (City of). The Meteorology of, for the year 1904. Fcp. Nottingham, 1905. *P. Boobbyer, M.D., M.R.C.S.*

Oldham. Report of the Work of the School Board, for the three years 1901-02-03. 120 pp., 8vo, Oldham, 1903.

Ostertag, *R., M.D.* Handbook of Meat Inspection. Translated by E. Vernon Wilcox, M.A., Ph.D., with an Introduction by John R. Mohler, M.A., D.V.M. 884 pp., 8vo. London, 1904. *Purchased.*

SUPPLEMENT.

Paris. *Service Technique des Eaux et de l'Assainissement.* Notes à l'Appui du Compte Dépenses de l'Exercice, 1903. 84 pp., 4to. Paris, 1904. *G. E. Bechmann.*

Price, *G. M., M.D.* Handbook on Sanitation: A Manual of Theoretical and Practical Sanitation. Second Edition. 301 pp., 8vo. New York, 1905. *J. Wiley & Sons (Publishers).*

Registrar-General. Sixty-sixth Annual Report of Births, Deaths, and Marriages in England and Wales (1903). 329 pp., 8vo. London, 1905. *The Registrar-General.*

Robertson, *W., M.D., D.P.H.;* **Porter,** *Chas., M.D., B.Sc.* Sanitary Law and Practice. A Handbook for Students. 756 pp., 8vo. London, 1905. *The Sanitary Publishing Co., Ltd.*

St. Thomas's Hospital. Reports for the year 1903. Vol. XXXII. 463 pp., 8vo. London, 1904. *The Hospital.*

Taylor, *Albert.* The Sanitary Inspectors' Handbook. Fourth Edition. 455 pp., 8vo. London, 1905. *The Publisher (H. K. Lewis).*

Thudichum, *G., F.S.C.* Simple Methods of Testing Sewage Effluents for Works Managers, Surveyors, etc. 60 pp., 8vo. London, 1905. *The Sanitary Publishing Co., Ltd.*

United States. Report of the Origin and Spread of Typhoid Fever in United States Military Camps during the Spanish War of 1898. Vol. I. and II. (Maps and Charts), by Walter Reed, Major and Surgeon, United States Army; Victor C. Vaughan, Major and Division Surgeon, United States Volunteers: and Edward O. Shakespeare, Major and Brigade Surgeon, United States Volunteers. 721 pp., 4to. Washington, 1904. *The United States Secretary of War.*

Vacher, *F., F.R.C.S.* The Food Inspector's Handbook. Fourth Edition. 223 pp., 8vo. London, 1905. *The Sanitary Publishing Co., Ltd.*

West Riding County Council. Report of the County Medical Officer upon the Sanitary Condition of the Ardsley East and West Urban District. 17 pp., fcp. Wakefield, 1905. *James R. Kaye, M.B., D.P.H.*

Woolwich. Report on the prevalence of Zymotic Enteritis, or Summer Diarrhœa, in 1904, by S. Davies, M.D., M.O.H. 16 pp., 8vo. London, 1905. *The Author.*

THE ROYAL SANITARY INSTITUTE.

REVIEWS OF BOOKS.

INFANTILE MORTALITY AND INFANT MILK DEPOTS.*

This work is a real service to the advancement of public health, not only because it describes the early formation of milk depôts for hand-fed infants, but still more because it foreshadows the direction in which the pioneer methods of the original depôts promise to advance and evolve a more perfect system of production and distribution of milk. It is far too immense an undertaking to attempt to reform the milk industry by one effort. Adults will probably continue for many years to consume hundreds of thousands or millions of micro-organisms per cubic centimetre in their milk, but it is a compassable task to endeavour to provide pure, fresh, and comparatively aseptic milk for nursing mothers and suckling infants.

Dr. McCleary, in company with the rest of the medical profession, is gradually working from ultimate effects back to primary causes. This is the course of all true theoretical and applied scientific work.

The question whether municipal authorities should provide milk for public sale, even to such a limited extent as to supply nursing mothers and suckling infants, may be a debatable question; but, surely, public authorities exist for the purpose of making inquiries, observations, and experiments, and giving object-lessons in the prevention of sickness and promotion of health, in the deferment of death and prolongation of life. The long history of both imperial and local government displays innumerable examples of these reasons for action, to the advantage both of the industries or occupations concerned and of the consumers or users of the products.

It is quite unnecessary to entertain the idea of the municipalisation of the milk supply, this is the Scylla; and it is equally remote to expect municipal authorities to tacitly acquiesce in the slaughter of the infantile population, this is the Charybdis of the question. But the middle course of empowering municipal authorities to organise the efforts of the medical profession and midwives, nurses, and others, to improve the health of mothers and encourage breast-feeding, so as to reduce the number of hand-fed children to a minimum, and to facilitate the provision of pure, fresh, comparatively aseptic milk for the fewer remaining hand-fed infants is surely commendable, except by those to whom national physical deterioration is a matter of indifference or profit. It is already apparent that sterilizing and pasteurizing are only an open invitation to produce and use unclean milk, and that hand-fed infants require special milk, produced

* Infantile Mortality and Infant Milk Depots, by G. F. McCleary, M.D., D.P.H., Medical Officer of Health of the Metropolitan Borough of Battersea. Crown 8vo., cloth. 27 full-page plates. 6s. net. P. S. King & Son, Orchard House, Westminster.

under aseptic conditions, accompanied by refrigeration and despatch in transport, and distributed in measured quantities in sealed bottles ready for suckling.

Dr. MCleary recognises that some of the details of his initial methods and those of others are not on the best lines, and he is very wisely modifying them as circumstances permit, and as experience dictates.

Bringing together under one cover the methods adopted by many workers in the same field makes this volume particularly useful as a work of reference to the subject of infants' milk depots, as at present organised in various parts of the world.

J. F. J. S.

HEALTH AT SCHOOL.*

The period which has elapsed since the year 1883, when the first edition of this well-known work appeared, has been marked by a steady advance in the practical application of hygienic principles to the scholar and his environment during school life. This advance has demanded a considerable expansion and rearrangement of Dr. Dukes' work since it first appeared. In the present edition one notes that a new chapter has been inserted upon those sudden emergencies incidental to school life which require immediate treatment by master or scholar before the services of the medical officer can be secured; the chapter on illness at school and the section upon Sanitation have been largely re-written, and improvements in the illustrations are also to be observed. The book is written from the standpoint of the large public school, by one who has had the advantage of a long experience of the needs, medical and sanitary, of such an institution. These needs are not even at the present time fully satisfied, and it is to be hoped that Dr. Dukes' book will be consulted largely by those who are responsible for secondary education.

It seems ungracious to even refer to a weak point in a work which contains so many strong ones, but in a subsequent edition the writer would do well to extend and revise the parts of the book dealing with practical sanitation, more especially in its reference to the most suitable provision of drinking-water and water-closet arrangements for the scholars.

The present edition retains the handy form of previous editions, and it has been well produced by the publisher.

H. R. K.

THE FOOD INSPECTOR'S HANDBOOK.†

The popularity of the former editions of this admirable little handbook should be increased by the advent of the new edition. The author has considerably added to the usefulness of the work by adding chapters 2 and 3, which give a concise and lucid epitome of the statutory enactments which food inspectors and others will find most valuable.

A. W. H.

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* "Health at School." By Clement Dukes, M.D., B.S.Lond. Fourth Edition, revised, enlarged, and illustrated. 606 pp. London: Rivingtons, 1905.

† The Food Inspector's Handbook, by Francis Vacher, F.R.C.S. 231 pp., 8vo. Price 8s. 6d. net. The Sanitary Publishing Co. London. 1905.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
Hygiene of Special Classes, Trades, and Professions; and Municipal Administration.
Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

The articles referred to in this list are as far as possible collected and filed in the Library of the Institute for the use of the Members and Associates.

Science in relation to Hygiene and Preventive Medicine.

McFadyean, John, M.B., B.Sc., M.R.C.V.S. Glanders. *Journal of State Medicine.* Feb., 1905, p. 65.

Being the second Harben Lecture for 1904.

Oliver, Thomas, M.D., F.R.C.P. The Miners' Worm Disease as seen in Westphalia and Hungarian Collieries. *Journal of State Medicine.* April, 1905, p. 189.

Reid, T. Whitehead, M.D., F.R.C.P. School Food. *Journal of State Medicine.* April, 1905, p. 203.

Building Materials, Construction, and Machinery.

Hain, James C. Mortar Sand. *Engineering Record.* Jan. 28th, p. 103.

Laboratory tests of different samples of sand, with an account of their practical use for mortar and concrete.

Water Supply, Sewerage, and Refuse Disposal.

Adams, W. P. The Combination of Dust Destructors and Electricity Works economically considered. *Surveyor.* Jan. 13th, 1905, pp. 32-3.

The incombustibility of refuse; the progress and development of refuse destructors; different types of destructors; tables of general information on combined works.

——— The Combination of Dust Destructors and Electricity Works economically considered. *Surveyor.* Jan. 20th, 1905, pp. 56-7.

Site, buildings, and chimney—plant—tables of refuse collection and disposal—costs of disposal—destructor revenue—fuel and wages cost.

BRYAN, A., C.E. Description of Purification Works in course of construction at Minworth Greaves, Birmingham. *Surveyor.* Sept. 16th, 1904, pp. 316–17.

Adoption of site; description of works; silt tanks; experimental beds; percolation beds; cost; observations; analyses of effluent.

DEVONSHIRE, EASTON, A.M.Inst.C.E. Municipal and Suburban Water Supplies of Brussels. *Surveyor.* Aug. 19th, 1904. p. 211.

Municipal water supply of Brussels—the Hain supply—Forest of Soignes supply—the Laeken water supply—intercommunal water supply.

HART, GEO. A. Recent Experience in Sewage and Sludge Disposal at the Birmingham Outfall Works. *Surveyor.* Sept. 9th, 1904, p. 285.

Modifications during the past three years—description of works—treatment—analyses—expenses and particulars of works.

LATHAM, FRANK, M.Inst.C.E. The Water Supply of Penzance and the Hydro-Geology of Cornwall. *Surveyor.* Dec. 16th, 1904, p. 707.

Well water at Penzance; service pipes; Cornish reservoir sites; Heamoor reservoir; choking of Artesian wells.

MERRILL, ALBERT S. The Water-meter Testing Equipment of the Bureau of Standards. *Engineering Record.* Jan. 28th, 1905, p. 110.

Description of the apparatus used in testing water-meters by the Bureau of Standards, Washington, U.S.A.

Heating, Lighting, and Ventilating.

"ENGINEERING RECORD." Heating and Ventilating Trinity Church, Portland, Oregon, U.S.A. April 1st, 1905, p. 390.

Application of hot-air furnace and forced blast fan, with system of distribution for 34,000 cubic feet of air per minute. Illustrated.

GRUNDY, H. H. The Warming of Public Buildings by the Warm-air System considered from a Hygienic point of view. *Surveyor.* Oct. 21st, 1904, pp. 484–5.

Comparison with other systems—necessity for fresh air—its introduction into buildings—description of the system.

HENMAN, WILLIAM, F.R.I.B.A. Ventilation. *Building News.* Nov. 18th, 1904, pp. 711–12.

Science of ventilation—the movements of air, in dwelling houses, assembly rooms, &c.—position of air inlets and outlets, doors, and windows—changes of of air in apartments—mechanical ventilation.

LISTER, F. S., A.M.Inst.C.E. The Ventilation of Factories and Workshops. *Builder.* March 18th, 1905, p. 284.

Description of necessary modifications in the Plenum and Vacuum systems in adapting them to factories, &c.; also the method for removing dust, fumes, &c., from the point of origin and their disposal.

MEETINGS HELD.

CONFERENCE ON SCHOOL HYGIENE AND EXHIBITION OF SCHOOL BUILDING AND FURNISHING APPLIANCES.

This Conference and Exhibition, which was organised by The Royal Sanitary Institute to pave the way to the International Congress on School Hygiene in London in 1907, was held at the University of London, South Kensington, from February 7th to 10th.

At the opening meeting on February 7th the President of the Institute, His Grace the Duke of Northumberland, K.G., Sir Arthur Rücker, F.R.S., President of the Conference, the Chairman, Mr. W. Whitaker, F.R.S., and other Members of the Council, received the Delegates and Members, who numbered over 500.

Sir Arthur Rücker delivered his Presidential Address, on "The Coordination of the Teaching of Hygiene," after which an inspection was made of the Exhibition. Music and light Refreshments were provided in the Western Gallery.

The Conference continued on the three succeeding days, and six sittings were held, presided over by Sir T. Lauder Brunton, LL.D., F.R.S., when the subject discussed was "Scholars—Physical and Mental Development during School Life"; Rt. Hon. Lord Reay, G.C.S.I., G.C.I.E.: "Scholars—Physical Inspection of"; Sir William Anson, Bart., M.P.: "Schools—Building and Equipment"; Mr. W. Whitaker, F.R.S.: "Schools—Sanitary Inspection"; Sir William J. Collins, D.L., J.P.: "Training of Teachers in Hygiene"; The Rt. Rev. The Lord Bishop of Hereford: "Training of Scholars in Hygiene."

The Physiological Laboratory of the University was thrown open for the inspection of the Members, and the Director, Dr. Waller, kindly received and conducted those attending over the Laboratory.

151 Authorities appointed 310 Delegates to the Conference, and a large number of Members attended.

The Exhibition held in connection with the Conference afforded an opportunity for bringing together a large number of exhibits of special interest to those engaged in or connected with school-work. The exhibits were classified in Sections, under Drawings and Designs, Site, Building Materials and Construction, Floors and Walls, Water Supply, Drainage, Sanitary Appliances and Fittings, Warming, Lighting and Ventilating, Furnishing and Equipment, Teaching and Technical Appliances, Decoration, Playgrounds, Old Buildings, showing the comprehensive character of the Exhibition.

The Report of the Proceedings of the Conference, together with List of Awards made at the Exhibition, appear in the April number of the Journal, Vol. XXVI., Nos. I.—III.

Institute Dinner.

The Institute Dinner was held in the Princes Restaurant on Friday, May 12th, 1905, His Grace the Duke of Northumberland, K.G., President of the Institute, in the Chair. One hundred and eight members and guests were present, amongst whom were:—The Rt. Hon. Earl Egerton of Tatton, Vice-President; the Rt. Rev. the Lord Bishop of Hereford (J. J. Percival, D.D.); Sir R. Douglas Powell, Bart., K.C.V.O., President of the Royal College of Physicians; Sir Henry C. Burdett, K.C.B.; Sir Francis Sharp Powell, Bart., M.P., Vice-President; Sir Wm. J. Collins, D.L., J.P., Chairman of the Education Committee, London County Council; Sir Arthur W. Rücker, LL.D., F,R.S., Principal of the University of London; Sir Aston Webb, R.A., Vice-President; Sir George Hare Philipson, LL.D., Principal of the Durham College of Medicine; Sir Alexander R. Binnie, President of the Institution of Civil Engineers; Sir Shirley F. Murphy, Vice-President; Director-General Herbert Mackay Ellis, Royal Navy Medical Department; Rev. H. Russell Wakefield, The Worshipful the Mayor of St. Marylebone; Augustus C. Scovell, J.P., Chairman of the Metropolitan Asylums Board; Dr. Andrew Clark, Chairman of Council, British Medical Association; Dr. J. F. J. Sykes, President of the Incorporated Society of Medical Officers of Health; Col. J. Lane Notter, R.A.M.C., Chairman of the Council, and the Council of the Institute.

The Bishop of Hereford said that the House of Lords, while composed of varying elements and diverse views, was unanimous in their admiration for the work of the Institute, and in their respect and gratitude for those who had maintained and developed its work for improving the health conditions of the country. The homes of the working classes, both in town and country, ought to be far more sanitary. One of his clergymen told him that in his parish of 4,000 there were no less than 120 houses that were not fit for the upbringing of children, and, priding themselves as they did upon their Imperialism, it was high time that they looked to the welfare of the younger members of the Empire.

Sir F. Sharp Powell, Bart., said he thought that a great part of the duty of Parliament in regard to sanitary legislation had been done for the time, and now it rested with the local authorities throughout the country to exercise their large powers with discretion, firmness, and wisdom. There were some cases which he knew of where these powers had been exercised in such a vexatious way as to have thrown back the cause; he hoped that with gentleness, wisdom, discretion, and knowledge these powers might be put into operation in such a manner as to prevent a reaction—an evil which he feared—and that there would be a continual progress and advance towards that most perfect condition to which he hoped we should all arrive. Many sanitary reforms would have to be made, and he would like to see placed upon the statute book the consolidation of our sanitary laws; they were far too antiquated and complicated. It would be a great benefit to this country when public opinion became so active as to force Parliament to take up this question. The present Legislature was not insensible to duty in this matter, and it

was a want of opportunity which prevented a Bill being introduced to consolidate the public health law of the country.

His Grace the Duke of Northumberland said, with regard to the new buildings, after outlining the work carried on by the Institute, that the penalty of so much success is that we grow out of our clothes. The Council have decided, therefore, that we must go to the tailor. You know well that we have a valuable Museum and Library, that we have much work in the way of lecturing and training in sanitary science, in examining those who will submit themselves for examination, and in levelling up the sanitary position of those who have the charge of health throughout the country; and I think, and the Council think also, that the time has come when it is necessary to have more room. You have had before you a scheme to acquire a very excellent site in an important part of London, where it would be possible for us to erect a building that would meet our need. We have a certain amount of money towards that, about £10,000, but we want £15,000 more if we are to enter upon it. That is a very serious amount to raise, but I cannot help thinking that if each of us does his best to meet the demands of this kind, and if we appeal to all those throughout the country who really appreciate the work that we are doing, it may not be impossible to reach that sum, and put The Royal Sanitary Institute in a position locally which shall be worthy of its great achievements. And now one word more; I presume that the duty which we set before us, by the various agencies that we put in force, is to maintain a high standard of sanitary science, both in theory and practice, throughout the country. I hope that we shall always remember that the best is the enemy of the good, and that we shall do all that we can to look at the thing from a practical point of view, and to secure for the people of this country the sanitary conditions that are possible, rather than by aiming too high.

Col. J. Lane Notter said, on behalf of the Council and Members of The Royal Sanitary Institute, I have to thank your Grace for the kind words you have spoken, and for the interest you take in the work of the Institute. Our aim has been to carry out that great duty which devolves on us as members of the State, 'to render growth more perfect, decay less rapid, life more vigorous, and death more remote.' To do this, or even to attempt such an ideal, has entailed much labour and time, given with ungrudging devotion by members of the Council, all of whom are busily engaged in the active pursuits of their various professions. The founders of the Institute, men of thought and leading in their day, laid down for us as perfect an organisation as perhaps it is possible to conceive, and to these first principles your Council has rigidly adhered. The representatives on the governing body are taken from the various professions: architects, engineers, medical men, and men of science, who have made sanitary work their special study, and are little liable to be led away by 'faddists,' or those whose calling or sympathies in one direction often cause them to advocate extreme measures of reprisals or control, by which

they lose the confidence of the public on all sanitary measures they advocate. The Institute has contributed largely to the education of inspectors in sanitary work, and may be said to have laid the foundation of this knowledge by their methods of teaching and examination. To further develop this great work your Council find it necessary to move into larger premises, as they are terribly handicapped in Margaret Street for want of room and space to carry on the work of which I should like to call The Royal Imperial Sanitary Institute, for our work is not confined to the United Kingdom, but embraces nearly all our dominions beyond the sea. The plan of the proposed site has been circulated to the members, but it is not the intention of the Council to adopt this or any scheme without taking the members of the Institute into their entire confidence; and as soon as they are in a position to do so they propose to call a general meeting of the Fellows, Members, and Associates. Much will depend on the present appeal for funds. So far I am happy to say that the proposed scheme appears to appeal to all classes of members, and a number of donations have been received from Associates, many of them of limited means, but who have promised small annual subscriptions. The deep interest taken in the work of the Institute by its former members cannot be better exemplified than by what has been done by the late Mr. Saxon Snell, a former member of the Council, who left a sum of money the interest on which is to be awarded triennially as a prize to encourage improvements in sanitary apparatus. The influence of the Institute, and the confidence reposed in its Council, have been shown by the many applications made to them by sanitary authorities for advice and counsel, and the requests to nominate experts for them when difficulties arise in their districts. Such work should appeal to all members of the community, and I earnestly hope that a hearty response will be made to an appeal to help us in our work and to further increase the influence of The Royal Sanitary Institute; to help us in our endeavour to teach the first principles of a healthy home, and to ensure the fulfilment of those great duties which are placed on sanitary authorities by Parliament, by providing an educated body of men to carry out the work entrusted to them.

Sessional Meetings.

London.—The Meeting was held in the Parkes Museum on Monday, May 8th, 1905, when a discussion on "Housing in Mansions let as Flats" was opened by Louis C. Parkes, M.D., D.P.H., and W. Rolfe (Architect). The chair was taken by Sir William Emerson.

Examinations.

During May the following Examinations were held:

Sanitary Science as applied to Buildings and Public Works.

May 5 and 6.	London.	24 Candidates;	9 Certificates granted.
May 19 and 20.	Edinburgh.	1 ,,	1 ,, ,,

Inspectors of Nuisances.

May 5 and 6.	London.	83 Candidates; 37 Certificates granted.
May 19 and 20.	Edinburgh.	25 „ 15 „ „

Inspectors of Meat and other Foods.

May 12 and 13.	London.	20 Candidates; 19 Certificates granted.

CANDIDATES WHO HAVE RECEIVED CERTIFICATES.

Sanitary Science as applied to Buildings and Public Works.

1905, May 6. DUNK, WILLIAM MAJOR.
1905, May 6. GRAY, HORACE NORMAN
1905, May 6. HENNIKER, ALAN MAJOR (Capt. R.E.)
1905, May 6. NUGENT, EBENEZER.
1905, May 6. REYNOLDS, GEORGE HENRY.
1905, May 6. SAUNDERS, EDWARD YOUNGS.
1905, May 6. SEDEN, JAMES LEONARD
1905, May 6. SKELTON, RICHARD ALLINSON.
1905, May 6. WELSH, THOMAS JAMES.

Inspectors of Nuisances.

1905, May 6. BAILEY, GEORGE RANDALL.
1905, Apr. 15. ‡BEALES STEPHEN
1905, Apr. 15. ‡BENTLEY, WILLIAM.
1905, May 6. BETTS, THOMAS CROWTHER.
1905, May 6. BROOKS, HENRY
1905, May 6. BROWN, DAVID JAMES.
1905, May 6. BROWNE, WILLIAM GEORGE HENRY.
1905, May 6. BUSCOMBE, REGINALD THOMAS.
1905, May 6. *L* CALLIS, ANNIE CAROLINE.
1905, Apr. 15. *L* CLARK, FLORENCE ISABELLA.
1905, May 6. COTTLE, STANLEY BROOKES.
1905, May 6. CHETHAM, WILLIAM HENRY
1905, May 6. CLEGG, WILLIAM BENJAMIN.
1905, May 6. COOPER, CHARLES JOHN
1905, May 6. CRADOCK, JOHN TYRWHITT.
1905, May 6. CRISWELL, WALTER.
1905, Apr. 15. CUNLIFFE, THOMAS.
1905, Apr. 15. ‡DE LUCEY, CELSUS.
1905, Apr. 15‡*L* DICKINSON, JANE.
1905, May 6. EDWARDS, ARTHUR JAMES.
1905, Apr. 15. FORTUNE, FRANK ERNEST.
1905, Apr. 15. GOODMAN WILLIAM HENRY.
1905, Apr. 15. ‡GREEN, ALFRED ERNEST.
1905, May 6. GREEN, FREDERICK WILLIAM.
1905, Apr. 15. ‡HAIGH, JESPER.
1905, May 6. HEWETT, ERNEST THOMAS.
1905, May 6. HOOLEY, ALICK HASTINGS.
1905, Apr. 15. ‡HOWARTH, THOMAS BLAND.
1905, May 6. HUNT, LEWIS WALTER.
1905, May 6. JONES, WILLIAM.

1905, May 6. KEENE, BEN ALBERT GEORGE.
1905, May 6. KEMP, GEORGE H
1905, Apr. 15. KENYON, HERBERT.
1905, May 6. *L* LESSEY, LOUISE PAULINE.
1905, Apr. 15. ‡LINFOOT, THOMAS ALBAN.
1905, May 6. MANNING, JOSEPH.
1905, Apr. 15. ‡MALLEY, HARRY.
1905, May 6. MARCHANT, FREDERICK THOMAS.
1905, May 6. *L* MARX, CONSTANCE MARGARET.
1905, May 6. MCCARTER, HERBERT.
1905, Apr. 15. MCCULLOCH, CHARLES ALFRED.
1905, May 6. ORCHARD, ARTHUR JAMES.
1905, May 6. PARHAM, WILLIAM HENRY.
1905, May 6. PIPER, FREDERICK SAMUEL FIELDING.
1905, May 6. PLUMMER, GEORGE.
1905, May 6. PRICE, ROBERT LEWIS.
1905, Apr. 15. QUAYLE, WILLIAM EDWARD.
1905, Apr. 15. ‡RICHARDSON, JOHN.
1905, May 6. RICKARD, WILLIAM CHARLES.
1905, Apr. 15. *L* ROGERS, EMMA AMELIA.
1905, May 6. ROGERS, SIDNEY JOHN.
1905, Apr. 15. RUTTER, FREDERICK THORNTON.
1905, May 6. SAVILL, FRANK.
1905, May 6. SMEED, GEORGE HUBERT.
1905, May 6. SMITH, PERCIVAL AUGUSTUS.
1905, Apr. 15. STONE, WILLIAM JAMES.
1905, Apr. 15. THORNEYCROFT, EDWARD.
1905, May 6. WEST, RICHARD ALEXANDER.
1905, Apr. 15. ‡WILLIAMSON, FRANK, Leeds.

Inspectors of Meat and Other Foods.

1905, May 13. BILLING, GEORGE TIMOTHY.
1905, May 13. BROOKE, HUGH FENWICK, *Capt.* A.S.C.
1905, May 13. BUTLER, STANLEY GEORGE MONTAGUE.
1905, May 13. CUMBERLEGE, HENRY CHARLES FAITHFULL, *Capt.* A.S.C.
1905, May 13. DAVIS, GEORGE EDWARD JAMES.
1905, May 13. FAIRHURST, THOMAS.
1905, May 13. FISHER, GEORGE.
1905, May 13. JACK, HERBERT ROWETT HENRY, *Major* A.S.C.
1905, May 13. KING, CHARLES WALLIS, *Major* A.S.C.
1905, May 13. LONG, ARTHUR, *Major* A.S.C.
1905, May 13. MOFFATT WILLIAM HAROLD.
1905, May 13. PENN ERNEST WILLIAM.
1905, May 13. PLUMB, ALBERT HERBERT
1905, May 13. RAMSDEN, FREDERICK ST BEDE.
1905, May 13. SANDILANDS, PHILIP ORDE, *Major* A.S.C.
1905, May 13. SWABEY, WILFRED SPEDDING, *Major* A.S.C.
1905, May 13. THORPE, WILLIAM.
1905, May 13. WICKHAM, ROBERT.
1905, May 13. WRIGHT, FITZWILLIAM.

FORTHCOMING MEETINGS.

Sessional Meetings.

The following arrangements have been made:—

London, June 16th. "Sanatoria for Consumption: Design and Location," by Edwin T. Hall, F.R.I.B.A. Visit to Heatherside Sanatorium, Frimley. The members will be received by the Chairman of the Hospital, Major-General Lord Cheylesmore, and the Vice-Chairman, Mr. G. St. Croix Rose, and entertained at luncheon. Specially-reduced railway fares are being arranged.

Cambridge, July 15th. "Distribution of Water Supply in County Areas," by Prof. G. Sims Woodhead, M.D. Visit to Waterworks and Wells in the Cam Valley.

Examinations.

In Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances under the Public Health Act, 1875:—Leeds, June 2nd and 3rd; Belfast, June 9th and 10th; Manchester, June 23rd and 24th.

Inspectors of Meat and Other Foods:—Manchester, June 30th and July 1st.

Hygiene in its bearing on School Life:—Leeds, June 2nd and 3rd.

Calendar, June and July, 1905.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesday in each Month at 5 p.m.

Exhibition Committee . . . Congress and Editing Committee	Monday in the week preceding the Council, at 4.30 p.m. & 5.30 p.m.
Examination Committee . . . Museum and Library Committee	Tuesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Special Purposes Committee . Finance Committee . . .	Wednesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Parliamentary Committee . New Premises Committee . Disinfectant Standardisation Committee	As occasion requires.

The Parkes Museum is open free, on Mondays 9.30 a.m. to 8 p.m., other days 9.30 a.m. to 5.30 p.m. The Library and Office are closed at 1 p.m. on Saturdays.

Council and Committee Meetings are suspended during August and September, and the Museum and Library are closed on Public Holidays.

SUPPLEMENT.

1905, May 6. Keene, Ben Albert George.
1905, May 6. Kemp, George H.
1905, Apr. 15. Kenyon, Herbert.
1905, May 6. *L* Lessey, Louise Pauline.
1905, Apr. 15. ‡Linfoot, Thomas Alban.
1905, May 6. Manning, Joseph.
1905, Apr. 15. ‡Malley, Harry.
1905, May 6. Marchant, Frederick Thomas.
1905, May 6. *L* Marx, Constance Margaret.
1905, May 6. McCarter, Herbert.
1905, Apr. 15. McCulloch, Charles Alfred.
1905, May 6. Orchard, Arthur James.
1905, May 6. Parham, William Henry.
1905, May 6. Piper, Frederick Samuel Fielding.
1905, May 6. Plummer, George.
1905, May 6. Price, Robert Lewis.
1905, Apr. 15. Quayle, William Edward.
1905, Apr. 15. ‡Richardson, John.
1905, May 6. Rickard, William Charles.
1905, Apr. 15. *L* Rogers, Emma Amelia.
1905, May 6. Rogers, Sidney John.
1905, Apr. 15. Rutter, Frederick Thornton.
1905, May 6. Savill, Frank.
1905, May 6. Smeed, George Hubert.
1905, May 6. Smith, Percival Augustus.
1905, Apr. 15. Stone, William James.
1905, Apr. 15. Thorneycroft, Edward.
1905, May 6. West, Richard Alexander.
1905, Apr. 15. ‡Williamson, Frank, Leeds.

Inspectors of Meat and Other Foods.

1905, May 13. Billing, George Timothy.
1905, May 13. Brooke, Hugh Fenwick, *Capt.* A.S.C.
1905, May 13. Butler, Stanley George Montague.
1905, May 13. Cumberlege, Henry Charles Faithfull, *Capt.* A.S.C.
1905, May 13. Davis, George Edward James.
1905, May 13. Fairhurst, Thomas.
1905, May 13. Fisher, George.
1905, May 13. Jack, Herbert Rowett Henry, *Major* A.S.C.
1905, May 13. King, Charles Wallis, *Major* A.S.C.
1905, May 13. Long, Arthur, *Major* A.S.C.
1905, May 13. Moffatt, William Harold.
1905, May 13. Penn, Ernest William.
1905, May 13. Plumb, Albert Herbert.
1905, May 13. Ramsden, Frederick St Bede.
1905, May 13. Sandilands, Philip Orde, *Major* A.S.C.
1905, May 13. Swabey, Wilfred Spedding, *Major* A.S.C.
1905, May 13. Thorpe, William.
1905, May 13. Wickham, Robert.
1905, May 13. Wright, Fitzwilliam.

FORTHCOMING MEETINGS.

Sessional Meetings.

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JUNE.

2 F. Lecture to School Teachers in the Parkes Museum, at 5 p.m., by Prof. H. R. Kenwood, M.B., D.P.H.

2 F. } 3 S. } Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, and in Hygiene in its bearing on School Life, Leeds.

9 F. Lecture to School Teachers in the Parkes Museum at 5 p.m., by J. Osborne Smith, F.R.I.B.A.

9 F. } 10 S. } Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Belfast.

16 F. Lecture to School Teachers in the Parkes Museum, at 5 p.m., by J. Osborne Smith, F.R.I.B.A.

16 F. **Sessional Meeting** at 4.30 p.m. in the Parkes Museum. Discussion on "Sanatoria: Design and Location," opened by E. T. Hall, F.R.I.B.A.

17 S. Visit to Heatherside Sanatorium, Frimley. Leave Waterloo (L. & S. W.) Railway Station at 11.50 a.m.

23 F. Lecture to School Teachers in the Library of the Institute, at 5 p.m, by J. Osborne Smith, F.R.I.B.A.

23 F. } 24 S. } Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Manchester.

30 F., and S., 1st July, Examination for Inspectors of Meat and other Foods, Manchester.

JULY.

7 F. } 8 S. } Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Norwich.

15 S. **Sessional Meeting** at 11 a.m. Cambridge. Discussion on "Distribution of Water Supply in County Areas," opened by Prof. Sims Woodhead, M.D., F.R.C.P., F.R.S.EDIN.

21 F. } 22 S. } Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Cardiff.

FELLOWS, MEMBERS, AND ASSOCIATES

FELLOWS.

Reg. No. | Date of Election.

298 1905. May. CLARK, Francis William, M.D., D.P.H., M.O.H., *Sanitary Board Offices, Hong Kong.*

299 1905. May. ELKINGTON, Major Henry Percival George, D.P.H., R.A.M.C., *Glenarthur, Netley Street, Farnborough.*

MEMBERS.

* Passed Examination in Sanitary Science as applied to Buildings and Public Works

1936 1905. May. ANDERSON, Joseph Barcroft, B.A., M.D., D.P.H., *Port Health Officer, East London, South Africa.*

1937 1905. May. BALL, Benjamin, *Borough Engineer and Surveyor, Town Hall, Nelson.*

1938 1905. May. BRUNTON, Sir Lauder, M.D., F.R.S., 10, *Stratford Place, W.*

1939 1905. May. ELCE, William Henry, ASSOC.M.INST.C.E., *Borough and Water Engineer, Municipal Offices, Bacup, Lancs.*

1940 1905. May. ROBINSON, Tom, *District Council Office, Hoylake, Cheshire.*

1941 1905. May. BURN, Walter, ASSOC.M.INST.C.E., *Springside, Sutton-in-Ashfield.*

Reg. No. | Date of Election.

1942 1905. May. JAMES, Colonel Herbert Ellison Rhodes, F.R.C.S., D.P.H., *Royal Army Medical Corps*, 68, *Victoria Street, S.W.*

1943 1905. May. LAURIE, Robert, M.D., C.M.EDIN., *Lorne Villa, Ormaston Road, Derby.*

1944 1905. May. LUTOSLAWSKI, Karimierz, M.D. ZURICH, *Warsaw, Poland.*

1945 1905. May. MAUGHAN, Nicholas, ASSOC. M. INST. C. E., *Drainage Engineer, Bombay Municipality, India.*

1946 1905. May. WOOD, Henry, ASSOC.M.INST.C.E., *City Engineer's Office, Norwich.*

1947 1905. May. *CUNNINGHAM, P. A., *H.M. Naval Yard Extension, Hong Kong.*

1948 1905. May. *GOODE, William John, *The Elms, Cemetery Road, Wellington, Salop.*

1949 1905. May. *HUGHES, William Thomas, 43, *Lord Street, Wolverhampton.*

1950 1905. May. *LONGSDON, Ernest Morewood, F.S.I., *Town Hall, Bakewell, Derby.*

ASSOCIATES.

‡ Passed Examination for Inspector of Nuisances.

3519 1905. May. ‡BEALES, Stephen, 5, *Park Avenue, Timperley, Ches.*

3520 1905. May. ‡BENTLEY, William, 468, *St. Helens Road, Bolton, Lancashire.*

3521 1905. May. ‡BINTCLIFFE, Harold, 17, *Brunswick Street, Halifax.*

3522 1905. May. ‡DE LUCEY, Celsus, 3, *Trent Street, Queen's Park, Manchester.*

3523 1905. May. ‡DICKINSON, Miss Jane, 6, *Bannister Street, Lytham, Lancashire.*

3524 1905. May. ‡GREEN, Alfred Ernest, 49, *High Street, Amble, Northumberland.*

3525 1905. May. ‡HAIGH, Jesper, 83, *Chatsworth Road, Morecambe.*

3526 1905. May. ‡HOBBS, Alfred William, 3, *Raby Road, New Maldon, Surrey.*

3527 1905. May. ‡HOOLEY, Wilfred, *Y.M.C.A., Montreal, Canada.*

3528 1905. May. ‡HOWARTH, Thomas Bland, 47, *Ratcliffe Street, Levenshulme, near Manchester.*

3529 1905. May. ‡KING, Percy Charles, *Warfelton House, Saltash, Cornwall.*

3530 1905. May. ‡LINFOOT, Thomas Alban, 13, *Woodside Terrace, Nelson, Lancashire.*

3531 1905. May. ‡MCINERNY, Miss Ellen Maria Elizabeth, 1, *Portland Villas, Saltash.*

3532 1905. May. ‡MILLER, Miss Clara Rosa, 102, *Trinity Road, Handsworth, Staffordshire.*

3533 1905. May. ‡RICHARDSON, John, 18, *Autumn Terrace, Alexandra Road, Leeds.*

3534 1905. May. ‡TOLMAER, Joseph, 21, *Milbourne Street, Blackpool, Lancashire.*

3535 1905. May. ‡WILLIAMSON, Frank, 71, *Westover Road, Bramley, Leeds.*

CONTRIBUTIONS AND ADDITIONS TO LIBRARY

*** *For publications of Societies and Institutions, &c., see under "Academies."*

ACADEMIES (British).

London. *British Association of Waterworks Engineers.* Transactions for the year 1904, with subject Index, Vols. I. to IX. 321 pp., 8vo. London, 1905. *The Association.*

——— *The Institution of Mechanical Engineers.* Proceedings of the Chicago Meeting, June, 1904, and List of Members. 960 pp. (Plates), 8vo. London, 1905. *The Institution.*

Local Government Board. Report by Dr. Darra Mair on Sanitary Administration in the Wrexham Rural District. No. 210. 11 pp., fcp. London, 1904.

——— Report by Dr. W. W. E. Fletcher upon the Sanitary Circumstances and Sanitary Administration of the Halstead Rural District. No. 211. 10 pp., fcp. London, 1905. *W. H. Power, C.B., F.R.S.*

London County Council. Watercress. Report of the Medical Officer, to which are appended Reports by Dr. Frank Clowes and Dr. A. C. Houston, on Watercress and Watercress beds in the neighbourhood of London. 18 pp., fcp. London, 1905. *The County Council.*

Pattin, *H. Cooper, D.M., M.A.* The Ritual of Temperance, and State Hygiene. 179 pp., 8vo. Norwich, 1905. *The Author.*

MEDICAL OFFICERS OF HEALTH AND OTHER SANITARY REPORTS.

Aberdeen, January & February, 1904 *Matthew Hay, M.D.*
——— December, 1904 .. .. *Matthew Hay, M.D.*
Aberdeen, 1904 (San. Insp.) .. *Kenneth Cameron.*
Aston Manor, 1904 .. .. .. *F. H. May, D.P.H., M.R.C.S.*
Audenshaw, 1904 .. .. .. *F. W. Allkin, M.B., M.O.H.*
Bath, 1904 .. .. *W. H. Symons, M.D., M.R.C.S., L.R.C.P.*
Bexhill, 1904 .. .. .. *O. Osborne, M.R.C.S., L.R.C.P.*
Birmingham (Public Analyst), 1904.. *J. F. Liverseege, F.I.C., Ph.C.*
Blackburn, 1904 .. .. .. *A. Greenwood, M.D., D.P.H.*
Blackpool, 1904 .. .. .. *F. J. H. Coutts, M.D., D.P.H.*
Bourne, 1904 .. .. .. *J. W. Burdwood, M.O.H.*
Bridlington, Borough of, 1904 .. *W. A. Wetwan, M.R.C.S., M.O.H.*
Bridlington R.D.C., 1904 .. .. *W. A. Wetwan, M.R.C.S., M.O.H.*
Brighton, 1904 .. .. .. *A. Newsholme, M.D., F.R.C.P.*
Bucklow, R.D.C., and **Knutsford, Middlewich, Winsford** and **Biddulph U.D.C's.,** 1904. .. .. *T. W. H. Garstang, M.R.C.S., D.P.H.*

Cheadle and Gatley, 1904	*John H. Godson, M.B., B.C., D.P.H.*
Chelmsford, 1904	*John C. Thresh, D.Sc., M.D., D.P.H.*
Dublin (City of), 1903	*Sir Charles A. Cameron, C.B., M.D., D.P.H.*
Eccles, 1904	*W. M. Hamilton, M.D., D.P.H.*
Exeter, 1904	*E. A. Brash, L.R.C.P., M.O.H.*
Failsworth, 1904	*G. S. Leslie, M.B., C.M., M.O.H.*
Harrow-on-the-Hill, 1904	*J. Fletcher Little, M.B., M.R.C.P.*
Hereford, 1904	*H. Cecil Moore, M.R.C.S., L.S.A., M.O.H.*
Huddersfield, 4th qtr. of year 1904 ..	*S. G. Moore, M.B., D.P.H.*
Kidderminster, 1904	*D. Corbet, M.R.C.S., M.O.H.*
Kincardine, (County of), 1904 ..	*W. A. MacNaughton, M.A., M.D., D.P.H.*
Kingston-upon-Thames, 1904 (San. Insp.)	*F. J. Pearce.*
Longton, 1904	*J. W. Dawes, M.B., C.M.*
London (City of), Four weeks ending Dec. 31st, 1904; two weeks ending Jan. 14th, 1905	*W. Collingridge, M.A., M.D., D.P.H.*
London (City of), Four weeks ending Feb. 18th, 1905; and four weeks ending March 18th, 1905.. ..	*W. Collingridge, M.D., M.A., D.P.H.*
Loughton (San. Insp.), 1904 ..	*S. T. Bocock.*
Maldon, 1904	*John C. Thresh, D.Sc., M.D., D.P.H.*
New Windsor, 1904	*E. Casey, M.O.H.*
Ontario, 1903.	*The Board of Health.*
Paignton, 1904	*A. J. Crathorn.*
Penge (San. Insp.), 1904	*A. J. Willett.*
Port Elizabeth (San. Insp.), 1904 ..	*S. Henry Kemp, Chief Sanitary Inspector.*
Richmond, 1904	*J. H. Crocker, M.D., D.P.H., M.R.C.S.*
River Tyne (Port Sanitary Authority), 1904	*W. E. Harker, M.D., B.S., D.Hy.*
Rothwell, 1904	*R. Stevenson, M.O.H.*
St. Ives, 1904	*J. M. Nicholls, M.O.H.*
S. Thomas, 1904	*M. Farrant, L.R.C.P., M.R.C.S., D.P.H.*
Southend-on-Sea, 1904	*J. T. C. Nash, M.D., M.S., D.P.H.*
Southport, 1904	*J. J. Weaver, M.R.C.S., L.S.A., D.P.H.*
Stockport, 1904	*Meredith Young, M.D., D.P.H.*
Stoke Newington, 1904	*Prof. H. R. Kenwood, M.B., D.P.H.*
Surbiton, 1904	*O. Coleman, M.D., D.P.H.*
Sutton Coldfield, 1904	*A. Bostock Hill, M.Sc., M.D., D.P.H.*
Transvaal, 1904	*G. Turner, M.O.H.*
Wandsworth, 1904	*H. G. Hills, Town Clerk.*
Waterloo-with-Seaforth	*W. S. Limrick, M.O.H.*
West Bromwich, 1904	*H. Manley, M.A., M.D., D.P.H.*
Wimbledon, 1904	*E. Pocklington, M.O.H.*

SUPPLEMENT.

EXHIBITS RECENTLY ADDED TO THE MUSEUM.

Asphalte. Models showing its application for damp-proof courses in foundations and basements, flooring channels, roofing, and flashings to ventilators, parapets, etc.
Lithophalt. Seating for machinery. *Limmer Asphalte Co., 2, Moorgate St., E.C.*
Ball Tap, improved pattern. *R. E. Bull, Selby Park, near Birmingham.*
Baths, two sheets detail drawings, showing construction in schools, Holland. *Alice Ravenhill.*
Boots after treatment in steam disinfector. *Dr. J. Robinson, Birmingham.*
Boots and Shoes, special shape and make to allow freedom of movement to foot. *Dowie & Marshall, Strand.*
Bottles, washing apparatus and brushes.
Drain-cleaning Brush, with spring attachment to cane rod. *G. F. Restall & Co., Park Rd., W.*
Cloak-room Fitting (all metal), double stand, with passage between: fitted with hat and coat pins, stick and umbrella stand and tray; all connected and easy of removal; mounted on rollers. *The "England" Works, Glengall Road, S.E.*
Damp-proof Course, in lengths 18 in. wide, ready for laying on walls. *La Brea Asphalte Co., Birmingham.*
Diagrams. Set of 12 for Health Lectures, prepared by Dr. Collie.
Lantern Slides. 12 of Health Lecture Diagrams (Collie). *W. & A. K. Johnson, Paternoster Row, E.C.*
Diagramatic Series of Plates, showing organs of cow. *W. Hunting.*
D-trap (lead) in section, showing closing up of channel by deposit. *Dr. Herman, 20, Harley Street, W.*
Drain Pipes, very old, unglazed, with peculiar jointing. *Dr. Louis C. Parkes.*
Dustless Chalk and Crayons, with special holder. *W. S. Thompson, Liverpool.*
Flushing Cistern, old type, piston pattern, iron. *Taylor & Jackson, Oldham.*
Individual Communion Cup and Tray (aluminium). *Alex. Knowles, Inverness.*
Lead burning Joints. *J. Wright Clarke.*
Magazine Holder, on adjustable stand. *Magazine Holder Co., Leeds.*
Non-flam Fire-resisting Flannelette. *Whipp Bros. & Todd, Manchester.*
Partition and Ceiling Slabs, fire resisting. *Excelsior and Phœnix Fire-resisting Partition Co., 163, Palmerston House, E.C.*
Plumbing Details, diagram working drawings. *S. Barlow Bennett, Durham.*
School Desk, dual seats, adjustable. *The Bennett Furnishing Co., Ltd., 47, Glengall Road, Peckham, S.E.*
Set of Drain Rods, with special joints. *Cakebread, Robey & Co., 86, High Street, Stoke Newington.*
Soil-pipe, glass-enamelled iron; fitted on stand. *D. King & Co., Possilpark, Glasgow.*
Taps, set of various, Ball Valves. *The Bradley Star Tap Co., Sheffield.*
Warble Fly, in chrysalis state. *A. E. Edwards, Romford, Essex.*
Water-softening Apparatus, domestic type. *The Lawrence Water, etc., Co., Norland Works, Shepherd's Bush, W.*

'HE ROYAL SANITARY INSTITUTE.

REVIEWS OF BOOKS.

›ORT ON THE ORIGIN AND SPREAD OF TYPHOID FEVER IN THE UNITED STATES MILITARY CAMPS DURING THE SPANISH WAR OF 1898.*

This Report is by far the most elaborate, scientific, and complete of its kind erto published. It is full of important details, and highly instructive with rd to the causes and means of prevention of typhoid fever, especially in p life. It should be stated that the Report deals almost entirely with the emics of typhoid fever in the Volunteer encampments within the United es during the Spanish-American War of 1898.

About the end of April of that year nearly 100,000 of these Volunteers mbled and encamped in their native States. After two or three weeks most ıe various regiments were drafted to the National encampments in selected ; in Virginia, Florida, Georgia, and Pennsylvania. It is reported that more ı one-third of the regiments had cases of typhoid fever amongst them by the › that they arrived at the National camps, whilst 98·11 per cent. had developed disease within eight weeks after their arrival.

In the five months, May to September inclusive, among 107,933 officers and in ninety-two regiments, 20,738 are reported to have become infected, and 0 (that is 14·63 per 1,000 of the mean strength) died of the disease.

On August 18th the Commission, consisting of Majors Reed, Vaughan, and ɛespeare, was appointed to inquire into the causes of the extensive epidemics, to make recommendations with a view to correcting any insanitary con›ns existing in the camps visited.

The Commission had exceptional opportunities for tracing out the origin and se of spread of the disease, and a study of their Report plainly shows that · made full use of their opportunities and powers with very satisfactory lts.

After inspecting the various National encampments they made an elaborate

* "Report on the Origin and Spread of Typhoid Fever in the United States Military ps during the Spanish War of 1898." By Walter Reed, Major and Surgeon, U.S. Army; ›r C. Vaughan, Major and Division Surgeon, U. S. Volunteers; and Edward O. :espeare, Major and Brigade Surgeon, U.S. Volunteers. Prepared in accordance with of Congress, under the direction of Surgeon-General Robert M. O'Reilly, U.S. Army. I., 739 pp.; Vol. II., Maps and Charts, 96 pp. Washington: the Government Printing e.

study of all the regimental and hospital sick reports. Wherever it was possible they traced out the individual cases as they were transported to divisional, military, and general hospitals. In this way every individual on the sick list was traced out, whether he suffered from continued fever or not.

By these means, and with the aid of experts using the Widal test, &c., a large number of undiagnosed cases were found to be suffering from typhoid fever, and many interesting relations of typhoid fevers to diarrhœas, and so-called "malarias" were demonstrated.

The above statements give only a small idea of the immense amount of evidence collected by the Commission. The Report contains detailed statements by the medical officers consulted directly or indirectly in connection with this Report, and also the sick lists of the various regiments.

These lists occupy a great deal of space, but they were inserted in order "to show exactly how the work was done." Readers of the Report are recommended to study first of all the Introduction, which gives a description of the methods of the Commission and an epitome of their work; and secondly, the General Remarks concerning typhoid fever in the various Army Corps, referring to the lists, tables, and charts in illustration of these remarks.

The General Statements and Conclusions contained in Chapter XIV., near the end of the Report, are of highest interest and importance. A careful study of the details of the Report, and of the elaborate and instructive charts and maps, of which Vol. II. consists, will show that the Commission had strong grounds for most or all of these conclusions. C. C.

BRITISH SEWAGE WORKS.*

The author (an American engineer) visited this country in 1904 with a view to collecting information about sewage disposal, and this book contains particulars of the systems that were in operation at twenty-four outfalls. Three of these are chemical precipitation works, five are sewage farms, the other sixteen include eleven with contact beds and five with percolating filters, for the final treatment of the sewage after passing either through septic tanks (the majority being open) or through sedimentation chambers. The author appears to have had the advantage of obtaining his information from those who were fully acquainted with the several works, so that the book may be regarded as containing reliable data for those who have to advise about the best means of arranging, or rearranging, sewage outfalls. This requires an unprejudiced and independent mind to determine the system or systems that are best suited to the circumstances of each case. Many towns have adopted arrangements which admit of alteration to effect economy and greater efficiency, in the light of experience that has accrued quite recently. H. R.

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* British Sewage Works, by M. N. Baker, Ph.B., C.E. 150 pp., 8vo. New York, 1904. *The Public Health Engineer.*

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
Hygiene of Special Classes, Trades, and Professions; and Municipal Administration.
Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

The articles referred to in this list are as far as possible collected and filed in the Library of the Institute for the use of the Members and Associates.

Water Supply, Sewerage, and Refuse Disposal.

ELLMS, J. W. The Coagulation and Precipitation of Impurities in Water Purification. *Engineering Record*, May 13th, 1905, p. 552.

Description of experiments for securing the coherence of impurities before filtration.

RAVENHILL, MISS ALICE. School Bath Centre, Amsterdam. *Builder*, Feb. 18th, 1905, p. 181.

Plan and section of Bath, with short description.

SMITH, FREDERICK J. OSBORNE. Country Houses and Accessory Buildings. *Builder*, March 4th, 1905, p. 229.

Paper read before Architectural Association upon the drainage and sanitary arrangements of the buildings.

Heating, Lighting, and Ventilating.

"ENGINEERING RECORD." Sanitary Engineering Work in a Large Residence. April 29th, 1905, p. 499.

Description of the sanitary plumbing, lighting, heating, ventilating, and telephone system of a large private building at Chestnut Hill, Massachusetts. Illustrated.

MEETINGS HELD.

SESSIONAL MEETINGS.

Birmingham.—The meeting was held in the University on Saturday, May 27th, 1905, when a discussion on "Certain Aspects of the Housing Problem" was opened by J. Robertson, M.D. The chair was taken by

G. Reid, M.D., D.P.H. Visits were made to recent Housing operations in the City, and to the Bournville Model Village.

London.—The meeting was held in the Parkes Museum on Friday, June 16th, 1905, when a discussion on "Sanatoria: Design and Location" was opened by E. T. Hall, V-P.R.I.B.A. The chair was taken by Major-General Lord Cheylesmore. On Saturday, June 16th, a visit was made to the Heatherside Sanatorium, Frimley, where the members were received by the Vice-Chairman of the Hospital (Mr. E. St. Croix Rose) and were entertained to luncheon.

EXAMINATIONS.

During June the following Examinations were held:

Sanitary Science as applied to Buildings and Public Works.

June 2 and 3.	Leeds.	1 Candidate;	1 Certificate granted.
June 9 and 10.	Belfast.	2 Candidates;	1 ,, ,,
June 23 and 24.	Manchester.	7 ,,	3 ,, ,,

Inspectors of Nuisances.

March 17 and 18.	Johannesburg.	37 Candidates;	16 Certificates granted.
June 2 and 3.	Leeds.	62 ,,	30 ,, ,,
June 8 and 10.	Belfast.	3 ,,	2 ,, ,,
June 23 and 24.	Manchester.	88 ,,	53 ,, ,,

Hygiene in its bearing on School Life.

June 2 and 3.	Leeds.	18 Candidates;	12 Certificates granted.

CANDIDATES WHO HAVE RECEIVED CERTIFICATES.

Sanitary Science as applied to Buildings and Public Works.

CAFFREY, JOHN.
DUNNING, WILLIAM JOHN.
FINDLAY, JAMES GLEN.
MYERS, ALBERT ROBERT.
RUSBY, SAM STEPHENSON.
SUMNER, EVAN.

Inspectors of Nuisances.

ALDERSLEY, JAMES EDWARD.
ALEXANDER, DONALD.
ALLISON, RICHARD.
ATKINSON, FREDERICK JOHN.
BAINBRIDGE, TOM.
BALLANTYNE, ROBERT DICK.
BALMFORTH, JAMES ARTHUR SHAW.
BEATTIE, RICHARD.
BLAKER, JAMES.
BOOKER, THOMAS EDMUND.
BOOTH, JOHN JAMES.
BOSWELL, THOMAS.
CAIRNS, ANDREW.
CARTLEDGE, THOS. ARTHUR.
CLAY, CHARLES JOSEPH.
COOK, JOHN CHARLES.
CUNLIFFE, EDWARD ROYSTON.
DAVIES, DAVID ROBERT.
DAVIES, NORAH KATHERINE.
DANIELS, HERBERT.
DAWSON, WILLIAM.
DAYES, GEORGE.
DEMPSEY, JOHN.
DODDS, ROBERT.
DONNELLY, SAMUEL H.
DOW, THOMAS CRAMP.
EDDLESTON, ALBERT.
EDWARDS, JOHN.
EVANS, WILLIAM EDMUND.
EWEN, PETER.

FISHBURN, FRANK.
FORSTER, WILLIAM.
FOWLER, WILLIAM.
GALLACHER, CORNWALL MARQUIS.
GIBSON, MARION.
GLEDSTONE, FRED.
GOURLAY, NORMAN MCLEOD.
GRAY, JOHN.
GRAY, THOMAS VINCENT.
GREG, SARAH ELEANOR.
HALL, CHARLES ERNEST.
HARDY, WILLIAM.
HARGRAVE, ERNEST LESLIE.
HARRISON, RICHARD.
HENRY, WILLIAM.
HULSE, FANNY.
HUMPHREYS, JOHN PARRY.
HURST, HENRY LOMAX.
INNES, JOHN.
JENKINS, DAN.
JONES, KATHERINE MAUDE.
LINDLEY, JOHN WILLIAM.
LOTLERING, THEUNIS CHRISTIAN.
LUPTON, JOHN WILLIAM.
LYON, HENRY.
MARCHANT, FREDERICK CHARLES.
MARTIN, AGNES LOUISE.
MARTIN, WALLACE RANDOLPH.
MARTIN, WILLIAM H.
MASSEY, SAMUEL.
MCADAM, JAMES, Junr.
MCDOWELL, WILLIAM HEMPHILL.
MCKINNA, ALEXANDER.
MCLINDON, BERNARD.
MILLAR, JEAN DRUMMOND.
MOORE, HAROLD.
MOORE, SAMUEL HOLDCROFT.
MORT, ALICE.
MUNRO, JAMES.
NOBLE, EDWARD ALBERT.
OAKES, HENRY HUGHES.
O'BRIEN, PATRICK JOSEPH.
OWEN, RICHARD E.
PALMER, MARGARET EDITH.
PARK, LILY MARIA.
PARKER, ROBERT.
PARKES, THOMAS ABEL.
PARRY, THOMAS RICHARD.
PENNY, ARTHUR GEORGE.
PREST, ENOS.
QUILLIAM, FLORENCE ELIZABETH.
RILEY, PHILIP.
SAGAR, JOSEPH.
SMAIL, ADAM.
SMITH, MAUDE HELENA.
STEVENSON, THOMAS KITCHEN.
SPURR, WILLIE ROWLAND.
STONE, ALBERT BRENTNALL.
SWEENEY, PATRICK.
SYKES, JAMES.
THORNTON, STEAD.
THOMPSON, CECIL KELSEY.
THOMPSON, FRANK.
THORNBOROW, JAMES PATTISON.
THORLEY, JOHN.
TOPHAM, WALTER CURRER.
TURNER, JOSEPH.
TUTT, BERTRAM GEORGE HOWARD.
VOLP, JOHN FREDERICK.
WALKER, WALTER JACKSON.
WALTON, HARRY.
WALTON, LILY ELIZABETH.
WATSON, WILLIAM CRUICKSHANKS.
WELCH, EBENEZER.
WHEATLEY, ANNIE.
WHITBY, HARRY JAMES.
WHITEHEAD, WILBYS.
WHITELEY, HARRY ASPLIN.
WILLIAMS, THOMAS CHRISTMAS.
WILLMOTT, RICHARD CHARLES.
WILSON, ERNEST.
WILSON, ROBERT.
WOOD, HENRY CLAYTON.
WOODCOCK, HERBERT DALE.
WORSLEY, JAMES.
WRIGHTON, FRANK ABNER.

Hygiene in its bearing on School Life.

ARMITAGE, SARAH LOUISA.
BADOCK, ANNA MAY VICTORIA.
BARRACLOUGH, FRED.
BUTLER, THOMAS EDWIN.
HAGGAS, RHODA HANNAH.
KING, NELLIE.
KIRK, FLORENCE.
LIMONT, SARAH WEDDELL.
RALPHS, EDWIN.
TANKARD, FREDERIC CYRIL.
TAYLOR, ALICE.
TOLSON, JANE ELIZABETH.

FORTHCOMING MEETINGS.

Sessional Meetings.

The following arrangements have been made:—

Cambridge, July 15th. "The Water Supply Problem in Rural Districts," by Prof. G. Sims Woodhead, M.D.; and "The Interpretation of the Reports of Water Analyses," by J. E. Purvis (Lecturer and Examiner in State Medicine, University of Cambridge). Visit to Waterworks and Wells in the Cam Valley.

Examinations.

In Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances under the Public Health Act, 1875:—Norwich, July 7th and 8th; Cardiff, July 21st and 22nd.

Calendar, July, 1905.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesday in each Month at 5 p.m.

Exhibition Committee Congress and Editing Committee	Monday in the week preceding the Council, at 4.30 p.m. & 5.30 p.m.
Examination Committee Museum and Library Committee	Tuesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Special Purposes Committee Finance Committee	Wednesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Parliamentary Committee New Premises Committee Disinfectant Standardisation Committee	As occasion requires.

The Parkes Museum is open free, on Mondays 9.30 a.m. to 8 p.m., other days 9.30 a.m. to 5.30 p.m. The Library and Office are closed at 1 p.m. on Saturdays.

Council and Committee Meetings are suspended during August and September, and the Museum and Library are closed on Public Holidays.

JULY.

7 F. } 8 S. } Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Norwich.

15 S. **Sessional Meeting** at 11 a.m. Cambridge. Discussion on "The Water Supply Problem in Rural Districts," opened by Prof. Sims Woodhead, M.D., F.R.C.P., F.R.S.EDIN.; and "The Interpretation of the Reports of Water Analyses," by J. E. Purvis (Lecturer and Examiner in State Medicine, University of Cambridge.)

21 F. } 22 S. } Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Cardiff.

FELLOWS, MEMBERS, AND ASSOCIATES ELECTED.

Reg. No. | Date of Election.

FELLOW.

1330 1905. June. CORNEY, The Hon. Bolton Glanvill, I.S.O., M.R.C.S., *Suva, Fiji.*

MEMBERS.

* Passed Examination in Sanitary Science as applied to Buildings and Public Works.

M Passed Examination for Inspectors of Meat and Other Foods.

1951 1905. June. ANDERSON, John Roger, J.P., *Bruno House, Beeston, Notts.*

1962 1905. June *M* BROOKE, Capt. Hugh Fenwick, *The Army Service Corps, Aldershot.*

1953 1905. June. BROWN, Harold Henry Lane, M.INST.C.E., M.I.M.E., *Lucknow, United Provinces, India.*

1952 1905. June. BUCK, Edward Clarke, C.E.(MELB.UNIV.), *Pretoria, Transvaal.*

1954 1905. June. CUMMING, John Ghest, M.A., M.B., *United Service Club, Calcutta, India.*

1963 1905. June. *DUNK, William Major, 92, *Cheriton Rd., Folkestone.*

1955 1905. June. ENGLISH, Henry Cecil, *Town Hall, Bloemfontein, Orange River Colony.*

1956 1905. June. FLINT, Frank Dean, "*The Moors,*" *Bishops Teignton, Teignmouth, Devon.*

1964 1905. June. *GRAY, Horace Norman, 334, *Commercial Road, E.*

1957 1905. June. HEMMING, Major Edward Hughes, R.E., *The Royal Horse Guards, War Office, Whitehall, S.W.*

1965 1905. June. *HENNIKER, Capt. A. M., R.E., 1, *St. Laurence Villas, Canterbury.*

1966 1905. June *M* KING, Major Charles Wallis, M.V.O., *The Army Service Corps.*

1970 1898. May. LOGIER, E. A., 23, *Suffolk Street, Dublin.*

1958 1905. June. MITCHELL, Ernest George, *Trewyn, College Road, Dulwich.*

1967 1905. June. *MYERS, Albert Robert, 206, *Bruntsfield Place, Edinburgh.*

1969 1905. June. *SKELTON, Richard Allinson, 160, *High St., Slough.*

1959 1905. June. SPITTA, Harold R. D., M.D., M.R.C.S., L.R.C.P., D.P.H., *St. George's Hospital. Hyde Park Corner, S.W.*

1960 1905. June. WANHILL, Capt. Charles Frederick, R.A.M.C., M.R.C.S., L.R.C.P., D.P.H., *Bermuda, N. American Station.*

1968 1905. June. *WELSH, Thomas James, *Royal Engineers' Office, Shorncliffe Camp, Kent.*

1961 1905. June. WILLIAMS, James Allan, M.D., C.M., D.P.H., *McGill University, Montreal, Canada.*

CONTRIBUTIONS AND ADDITIONS TO LIBRARY.

*** *For publications of Societies and Institutions, etc., see under "Academies."*

ACADEMIES (American).

Philadelphia. Transactions of the College of Physicians. Vol. XXVI. 319 pp., 8vo. Philadelphia, 1904. *The College.*

ACADEMIES (British).

London. *British Association for the Advancement of Science.* Report of the Seventy-fourth Meeting, held at Cambridge in August, 1904. 892 pp., 8vo. London, 1905. *The Association.*

——— *The Institution of Civil Engineers.* Minutes and Proceedings, with other selected and abstracted papers. Vol. CLIX. 478 pp., 8vo. London, 1905. *The Institution.*

——— *The Lister Institute of Preventive Medicine.* Collected Papers, No. 1. 8vo. London, 1904. *The Institute.*

Berne. Résultats du Recensement Fédéral du Bétail du 19 Avril, 1901. Tome II. 168 pp., 4to. Berne, 1905. *The Bureau.*

Board of Education. Special Reports on Educational Subjects. Vol. XV. School Training for the Home Duties of Women. Part I.: The Teaching of "Domestic Science" in the United States of America. 374 pp. 8vo. London, 1905. *The Board.*

Gréhant, N. Titres et Travaux Scientifiques. 114 pp., 8vo. Paris, 1905. *The Author.*

Local Government Board. Report by Dr. W. W. E. Fletcher upon the Sanitary Circumstances and Sanitary Administration of the Urban District of Nantyglo and Blaina, and upon Prevalence of Infectious Disease in the District. No. 212. 18 pp., fcp. London, 1905.

——— Report by Dr. Reginald Farrar on the Sanitary Condition and Administration in the Durham Rural District. No. 213. 11 pp., fcp. London, 1905.

——— Report by Dr. W. W. E. Fletcher upon the Sanitary Circumstances and Administration of the Pewsey Rural District. No. 214. 15 pp., fcp. London, 1905.

——— Report by Dr. G. S. Buchanan on the Sanitary Circumstances and Administration of, and as to Prevalence of Enteric Fever in, the Urban District of Sheerness. No. 215. 20 pp., fcp. London, 1905.

——— Report by Dr. Reginald Farrar on an outbreak of Enteric Fever at Denaby Main, in the Doncaster Rural District. 16 pp., fcp. London, 1905.

——— Dr. Reginald Farrar's Report on the Sanitary state and administration of the Howden Rural District in the East Riding of Yorkshire. 12 pp., fcp. London, 1905.

Local Government Board. Dr. S. W. Wheaton's Report on Smallpox in the Dewsbury Union. 9 pp., fcp. London, 1905.

——— Dr. W. W. E. Fletcher's Report upon the Sanitary circumstances of the Bywell Registration Sub-district of the Hexham Rural District, and upon the continued prevalence of infectious diseases therein. 27 pp., fcp. London, 1905.

——— Dr. G. S. Buchanan's Report on Smallpox in Gateshead and Felling, 1903–4, in relation to Sheriff Hill Hospital. 13 pp., fcp. London, 1904.

——— Dr. Reginald Farrar's Report on the Sanitary circumstances and administration of the borough of Bevrley, with special reference to the recent prevalence of Enteric Fever and Diarrhœa in the borough. 16 pp., fcp. London, 1904.

——— Dr. R. Deane Sweeting's Report upon an Outbreak of Enteric Fever at the villages of Edlesborough in the Wing Rural District, and Eaton Bray in the Eaton Bray Rural District. 7 pp., fcp. London, 1904.

——— Report by Dr. R. J. Reece on Smallpox and Smallpox Hospitals at Liverpool, 1902-03. No. 208. 15 pp. (Maps), fcp. London, 1905.

——— Report by Dr. J. Spencer Low upon the Sanitary Circumstances and Administration of the Haverfordwest Rural District. No. 209. 17 pp., fcp. London, 1904. *W. H. Power, C.B., F.R.S.*

London County Council. Report of the Education Committee, dated 7th April, 1905, on the Survey and Inspection of Non-provided Schools. 227 pp., fcp. London, 1905. *The County Council.*

MEDALS AWARDED FOR EXHIBITS SELECTED FOR FURTHER PRACTICAL TRIAL AT THE GLASGOW EXHIBITION, 1904 (SECOND LIST).

BRONZE MEDALS.

HEENAN & FROUDE.
Refuse Destructor Appliances.

SHANKS & Co.
New Pattern Syphonic Closet.

MEDALS AWARDED FOR EXHIBITS SELECTED FOR FURTHER PRACTICAL TRIAL AT THE EXHIBITION OF SCHOOL BUILDING AND FURNISHING APPLIANCES, 1905.

BRONZE MEDALS.

DUST ALLAYER Co.
Florigene Dust Allayer.

EDUCATIONAL SUPPLY ASSOCIATION.
Charts and Books, with tinted type and paper.

PARKES MUSEUM NEW PREMISES FUND.

The amounts allotted by the Council from the funds of the Institute, with the donations promised a few years ago, amounted to rather over £10,000; and Members will be interested in the following list of donations promised in response to the appeal made this year. All the Members and Associates will have received the letter asking if they would make some addition to their annual subscription for a few years for the purpose, and it is hoped that every Member and Associate will contribute something, even if the amount is not large. The Institute numbers over 3,000 Members and Associates, and a subscription averaging £1 a year for three or four years would go a long way towards the realisation of the scheme.

	£	s.	d.
AMOUNT ALLOTTED BY COUNCIL	9,000	0	0
CONTRIBUTIONS AND DONATIONS PROMISED 1899–1904	1,101	18	0

The List contains both the Donations promised in one sum and also the estimated value of additions to Annual Subscriptions promised for a certain pericd of years.

List of Contributions, 1905.

		£	s.	d.
THE MOST HON. THE MARQUESS OF NORTHAMPTON ...		10	0	0
THE RIGHT HON. EARL EGERTON OF TATTON		25	0	0
SIR ASTON WEBB, R.A.		20	0	0
SIR SHIRLEY F. MURPHY		5	5	0
HENRY ADAMS (2nd Donation)		5	5	0
R. ALEXANDER	during five years	1	2	6
F. ALLEN			10	6
F. ALLEN (2nd donation)	during five years	5	5	0
W. F. ANDERSON	during four years	2	2	0
JOHN ANDREWS		10	0	0
DR. H. E. ARMSTRONG	during five years	5	5	0
MISS L. H. ARNOLD			10	0
G. N. ASHURST			10	6
J. E. BARGATE	during two years	1	1	0
W. J. BASSETT		1	1	0
HENRY BATES	during five years	5	5	0
HUGH BENNETT	during five years	5	5	0
G. T. BILLING	during five years	2	12	6

		£	s.	d.
ILLINGTON	during six years	6	6	0
. BLANCHARD	... ...	1	1	0
PERCY BOULNOIS	... ...	5	0	0
V. BRADLEY	during five years	5	5	0
. G. BRADSHAW	during two years	1	1	0
. BREWER	during five years	1	2	6
V. BRIGGS	during ten years	5	5	0
I. BROOMFIELD	... ...	2	2	0
H. TIMBRELL BULSTRODE ...	... ...	5	5	0
BUNTEN	during five years	10	10	0
. BURNETT	... ...		10	0
. BUTCHER	... ...		10	6
. BUTCHER	during six years	18	18	0
BURY BROS., LTD.	... ...	20	0	0
. CALVERT & COMPANY ...	... ...	21	0	0
J. SPOTTISWOODE CAMERON ...	... ...	5	5	0
. CARTER	during five years	5	5	0
CARVER	... ...	2	2	0
AWOOD	... ...	0	10	6
A. K. F. DE CHAUMONT ...	... ...	5	0	0
N. T. F. DE CHAUMONT ...	during five years	5	5	0
V. CHILVERS	... ...	1	1	0
WRIGHT CLARKE (2nd donation)	... ...	2	2	0
WRIGHT CLARKE	during three years	3	3	0
V. COBBETT	during four years	2	2	0
J. NIELD COOK	... ...	2	2	0
V. COOK	during three years	1	8	6
I. COOPER	... ...	1	1	0
ORBETT	... ...	5	5	0
H. COWEN	during two years	1	1	0
R. H. CROWLEY	during five years	5	5	0
MAS W. CUTLER	during ten years	31	10	0
N DARCH	during five years	5	5	0
. DARUVALA	... ...	3	3	0
. DASHPER	during three years	1	11	6
UEL DAVIES	... ...	1	1	0
. DAWSON	during five years	5	5	0
. DONCASTER	... ...		10	6
ID DUNBAR	during three years	3	3	0

SUPPLEMENT.

		£	s.	d.
Dr. E. M. Smith	during two years	2	2	0
G. Smith	during five years	2	12	6
J. Osborne Smith		10	0	0
Alfred Saxon Snell		21	0	0
Alfred Saxon Snell	during five years	15	15	0
W. Stansfield	during three years	1	11	6
J. Freebairn Stow	during five years	5	5	0
E. Swainston	during a number of years	5	5	0
W. J. Tamlyn		1	1	0
Albert Taylor		2	2	0
W. A. Taylor	during ten years	5	5	0
R. W. Thomas		2	2	0
Miss A. Townend			10	6
A. B. Trickett			10	6
A. Turner		1	1	0
Dr. Francis Vacher		5	5	0
W. H. Wainwright	during two years	1	1	0
Alfred Waterhouse, R.A.		20	0	0
G. F. Wells	during five years	5	5	0
Mrs. A. A. Wheatley	during four years	1	0	0
W. Whitaker, F.R.S.		1	1	0
William Whitaker, F.R.S. ...	during four years	12	0	0
W. Herbert White	during three years	3	0	0
Dr. J. B. Wilkinson	during four years	2	2	0
J. E. Willcox		5	0	0
F. Wilson	during five years	1	2	6
R. Wood	during five years	10	10	0
T. Wood	during five years	2	12	6
Thomas Wragg & Sons, Ltd.		10	10	0
Rev. F. M. Wyndham		2	2	0
Other Amounts		1	14	0

Guarantee Fund.

H. D. Searles-Wood ...	£50	0	0	for four years	£200	0	0
Other promises	50	0	0	„ three „	150	0	0

June 26th, 1905.

THE ROYAL SANITARY INSTITUTE.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
Hygiene of Special Classes, Trades, and Professions; and Municipal Administration.
Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

The articles referred to in this list are as far as possible collected and filed in the Library of the Institute for the use of the Members and Associates.

Science in relation to Hygiene and Preventive Medicine.

BRIT. ASSOC. FOR 1904: Interim Report of Committee. The probability of Ankylostoma becoming a permanent inhabitant of our coal-mines in the event of its introduction. 1905, p. 292.

Sources of infection. Conditions underground in coal mines—preventive measures, etc.

GRAY, JOHN. An Anthropometric Survey. *Rep. Brit. Assoc. for 1904*, 1905, p. 706.

Utility to Science and to the State.

HOPKINSON, JOHN.
The Rainfall of the midland and eastern counties of England.
The Rainfall of England, 1861–1890.
Rep. Brit. Assoc. for 1904, 1905, p. 483.

MILL, DR. H. R. On the unsymmetrical distribution of rainfall about the path of a barometric depression. *Rep. Brit. Assoc. for 1904*, 1905, p. 480.

Hygiene of Special Classes, Trades, and Professions: and Municipal Administration.

BRIT. ASSOC. FOR 1904: Report of Committee. The conditions of health essential to the carrying on of the work of instruction in schools. 1905, p. 348.

Essential points in curriculum for training of teachers in school hygiene.

ROYAL ENGINEERS JOURNAL. Typhoid among soldiers in the field. 1905, Vol. i., No. 6, p. 530.

FISHER, MRS. The town housing question. *Rep. Brit. Assoc. for 1904*, 1905, p. 660.

LOW, SIDNEY. The increase of suburban populations. *Rep. Brit. Assoc. for 1904*, 1905, p. 661.

SHRUBSALL, DR. P. C. A comparison of the physical characters of hospital patients with those of healthy individuals from the same area, with suggestions as to the influence of selection by disease on the constitution of city populations. *Rep. Brit. Assoc. for 1904*, 1905, p. 702.

Refers to London.

SMART, PROF. W. Presidential Address to Section F. *Rep. Brit. Assoc. for 1904*, 1905, p. 639.

Housing of the Poor. Municipal work.

Building Materials, Construction, and Machinery.

ENGINEERING RECORD. The use of hydrated lime. 3rd June, 1905, p. 640.

Description of hydrated lime, and its advantages over quicklime for general plastering.

Water Supply, Sewerage, and Refuse Disposal.

BANCROFT, F. J. Presidential Address. *Trans. Brit. Assoc. Waterworks Eng.*, Vol. IX. (1905), p. 4.

Various questions concerning water supply. Chalk as a water-bearing stratum. Liability of well-water to pollution.

——— The Hull Water Supply. *Trans. Brit. Assoc. Waterworks Eng.*, Vol. IX. (1905), p. 212.

Historical and descriptive account. Wells in chalk.

JOURNAL BOARD OF AGRICULTURE. Hints on Water Supply. Vol. XII. (1905), No. 3, p. 144.

DAWKINS, PROF. W. B. The Permian and Carboniferous rocks in a section in High Street, Chorlton-on-Medlock, Manchester. *Trans. Manchester Geological and Mining Soc.*, Vol. XXIX. (1905), Pt. ii., p. 37.

Account of a boring for water at Victoria Baths, 760½ feet deep. Water got from carboniferous beds.

DEVERYHOUSE, A. R. The underground waters of north-west Yorkshire; Part ii. The underground waters of Ingleborough. *Proc. Yorksh. Geol. Soc.*, Vol. XV. (1905), Pt. ii., p. 248. (See also 335, pls. xxii.–xli. Also *Rep. Brit. Assoc. for 1904*, p. 225).

The courses of the water traced by experiments. Maps, sections, etc., given.

DEVONSHIRE, EASTON. The Antwerp Waterworks. *Trans. Brit. Assoc. Waterworks Eng.*, Vol. IX. (1905), p. 231, pts. 7 and 8.

Source of supply. Details of construction. Sand-filters. Sand-washing.

——— The municipal and suburban water supplies of Brussels. *Trans. Brit. Assoc. Waterworks Eng.*, Vol. IX. (1905), p. 246, Pts. 9–11.

The Hain, the Forest of Soignes, the Laeken, and the Intercommunal Supplies.

MEETINGS HELD.

Sessional Meetings.

Cambridge.—The meeting was held in the New Medical Schools, Downing Street, when a discussion on "The Water Supply Problem in Rural Districts," was opened by Prof. G. Sims Woodhead, M.A., M.D., and "The Interpretation of the Reports of Water Analyses," by J. E. Purvis, M.A., F.I.C., F.C.S., (Lecturer and Examiner in State Medicine, Cambridge). The chair was taken by W. Whitaker, B.A., F.R.S., F.G.S. Visits were made to the Pumping Works of the University and Town Water Company, and to the Nine Wells, Stapleford.

Examinations.

The following Examinations were held:

Sanitary Science as applied to Buildings and Public Works.

April 17 and 20.	Hong Kong.	7 Candidates;	2 Certificates granted.
July 7 and 8.	Norwich.	1 Candidate;	1 Certificate ,,

Inspectors of Nuisances.

April 17 and 20.	Hong Kong.	4 Candidates;	2 Certificates granted.
July 7 and 8.	Norwich.	16 ,,	9 ,, ,,

Inspectors of Meat and Other Foods.

June 30 and July 1.	Manchester.	10 Candidates;	5 Certificates granted.

Candidates who have received Certificates.

Sanitary Science as applied to Buildings and Public Works.

Denmark, Herbert Samuel.
Lamble, Philip Thomas.
White, James William.

Inspectors of Nuisances.

Amoore, Henry James.
Buttle, William Francis.
Killington, Charles.
Lloyd, William.
Montague, Eunice Mary.
Powers, Percy.
Sackett, Allen Alexander.
Saunders, Edward Youngs.
Small, Stuart Sidney.
Ward, Charles William.
Warren, Frank Reginald.

Inspectors of Meat and Other Foods.

Atkinson, Henry.
Brocklehurst, Augustus Cooke.
Brocklehurst, Josephus Higginbottom.
Cook, Arthur.
Marston, William.

CALENDAR.

Meetings of the Institute are suspended during August and September, but the Museum and Library are open at the usual hours.

FELLOWS, MEMBERS, AND ASSOCIATES ELECTED.

FELLOW.

Reg. No.	Date of Election.	
1801	1905. July.	TAYLOR, Gotfred Midgley, M.INST.C.E., F.C.S., 27, *Great George Street, Westminster.*

MEMBERS.

‡ Passed Examination for Inspectors of Nuisances.

1971	1905. July.	ADENEY, Walter Ernest, D.SC., *The Royal University, Dublin.*
1972	1905. July.	ARNEY, Arthur Edward, ASSOC.M.INST.C.E., *Superintendent of Water Supply, Claremont, West Australia.*
1976	1905. July.	‡BUTCHER, Charles Ernest, 273, *Finchley Road, S. Hampstead.*
1973	1905. July.	CHATFIELD, William Charles, *Architect, Wellington, New Zealand.*
1974	1905. July.	‡DOUGLAS, Sholto, *Engineer and Surveyor, Council Offices, Kenilworth, Warwick.*
1977	1905. July.	HARPUR, Alfred Oakes, *Engineer and Surveyor, Urban District Council, Caerphilly, Glamorgan.*
1978	1905. July.	HERON, George Allan, M.D., D.P.H., F.R.C.P., 57, *Harley Street, W.*
1979	1905. July.	MAYNE, Col. Charles Blair, R.E., 12, *Leopold Road, Wimbledon, Surrey.*
1975	1905. July.	SOMERVILLE, Arthur Fownes, J.P., *Dinder House, Wells, Somerset.*
1980	1905. July.	SWAIN, Walter, 26, *Austin Villa, Devonshire Buildings, Bath, Somerset.*

ASSOCIATES.

‡ Passed Examination for Inspectors of Nuisances.

3589	1905. July.	‡ATKINSON, Frederick John, 104, *High Street, Manchester.*
3590	1905. July.	‡BOOTH, John James, 162, *Upper Brook St., Chorlton-on-Medlock, Manchester.*
3591	1905. July.	‡DAVIES, David Robert, 3, *Nixon Ville, Merthyr Vale, Glam.*
3592	1905. July.	‡DAVIS, George Edward James, 110, *Calabria Road, Highbury, N.*
3593	1905. July.	‡DAWSON, William, 61, *Odsal Top, Bradford.*
3594	1905. July.	‡FISHBURN, Frank, 17, *Leake Street, Hull Rd., York.*
3595	1905. July.	‡GLEDSTONE, Fred, *Hyde House, Thackley, Bradford.*

Reg. No.	Date of Election.	
3596	1905. July.	‡Gray, Thomas Vincent, *c/o Mr. G. Kitchin, Shafton Lane, Holbeck, Leeds.*
3597	1905. July.	‡Harrison, Richard, 15, *Devon Street, Darwen.*
3598	1905. July.	‡Humphreys, John Parry, *Adwy-ddu, Penrhyndeudraeth, Merioneth.*
3599	1905. July.	‡Jenkins, Dan, 1, *Spring Gardens, Whitland, Carmarthen.*
3600	1905. July.	‡Lupton, John William, *North Lodge, New Park, Harrogate.*
3601	1905. July.	‡Marchant, Frederick Charles, 4, *St. George's Avenue, South Parade, Hull.*
3602	1905. July.	‡Moore, Samuel Holdcroft, 20, *Hilton Street, Birkenhead.*
3603	1905. July.	‡Noble, Edward Albert, 22, *Church Road, Lytham, Lancs.*
3604	1905. July.	‡Palmer, Miss Margaret Edith, 244, *Great Clowes Street, Higher Broughton, Manchester.*
3605	1905. July.	‡Park, Miss Lily Maria, 17, *Stansfield Street, Monkwearmouth, Sunderland.*
3606	1905. July.	‡Parry, Thomas Richard, *Ciltalgarth, Bala, North Wales.*
3607	1905. July.	‡Riddle, R. E., *Conheath, Bellingham, Northumberland.*
3608	1905. July.	‡Spurr, Willie Rowland, *Rouse Mill, Batley, York.*
3609	1905. July.	‡Sykes, James, *Prospect House, Cockerhill, Stalybridge.*
3610	1905. July.	‡Thompson, Cecil Kelsey, 6, *Victoria Square, Ella Street, Hull.*
3611	1905. July.	‡Thornborow, James Pattison, 65, *Hume Street, Stockton-on-Tees.*
3612	1905. July.	‡Turner, Joseph, 4, *Hopewell Terrace, Matlock, Derbyshire.*
3613	1905. July.	‡Tutt, Bertram George, *"Athelney," Albany Road, Leighton Buzzard.*
3614	1905. July.	‡Walker, Walter Jackson, 5, *Emville Avenue, Slaid Hill, Moortown, Leeds.*
3615	1905. July.	‡Walton, Miss Lily Elizabeth, *Public Health Dept., Parsons Lane, Bury.*
3616	1905. July.	‡Whitby, Harry James, 67, *Arthur Street, South Hill Road, Liverpool.*
3617	1905. July.	‡Whiteley, Harry Asplin, 15, *Larkhill, Brighouse, Yorkshire.*
3618	1905. July.	‡Wilson, Ernest, *Borough Surveyor's Dept., Pudsey, near Leeds.*
3619	1905. July.	‡Wilson, Robert, 70, *Pinfold Lane, Lancaster.*
3620	1905. July.	‡Wood, Henry Clayton, 5, *Bromfield Terrace, Tadcaster.*
3621	1905. July.	‡Woodcock, Herbert Dale, *Surveyor and Inspector, Guisborough, Yorks.*

CONTRIBUTIONS AND ADDITIONS TO LIBRARY.

, *For publications of Societies and Institutions, etc., see under "Academies."*

ACADEMIES (British).

London. *National Union of Teachers.* 35th Annual Report for the year 1905. 406 pp., 8vo. London, 1905. *The Union.*

Ackermann, *A. S. E., A.M.I.C.E.* British and American Coal-cutting Machines. 31 pp., 8vo. London, 1904. *The Author.*

Army Medical Department. Report for the year 1903. Volume XLV. 484 pp., 8vo. London, 1905. *The Director-General.*

Berne. Rapport du Bureau Fédéral des Assurances sur les Entreprises Privées en Matière d'Assurances en Suisse en 1903. 191 pp., 4to. Berne, 1905. *The Bureau.*

Board of Agriculture and Fisheries. Annual Reports of Proceedings under the Diseases of Animals Acts, the Markets and Fairs (Weighing of Cattle) Acts, etc., for the year 1904. 94 pp., 8vo. London, 1905. *The Board.*

Crewe. Special Report upon the Milk Supply of the Borough, by Andrew J. Laird, M.D., D.P.H. 23 pp., 8vo. *The Author.*

Factories and Workshops. Annual Report of the Chief Inspector for the year 1904. Part I. 359 pp., fcap. London, 1905. *A. Whitelegge, C.B., M.D., B.Sc.*

Hewitt, *Florence.* Elementary Lessons in Free-arm Drawing, with 390 Illustrations. Third Edition. 87 pp., 4to. Leeds, 1905. *The Author.*

Local Government Board. Report of Dr. S. Monckton Copeman on the General Sanitary Circumstances and Sanitary Administration, with special reference to the prevalence of Infectious Diseases, of the County Borough of Hanley. 25 pp., 8vo. London, 1905. *W. H. Power, C.B., F.R.S.*

Nürnberg. Bericht über den 1. Internationalen Kongres für Schulhygiene. Nürnberg, 4–9 April, 1904. Tome I., Erster Band, Vol. I., 561 pp.; Tome II., Zweiter Band, Vol. II., 516 pp.; Tome III., Dritter Band, Vol. III., 562 pp.; Tome IV., Vierter Band, Vol. IV., 528 pp. 8vo. Nürnberg, 1904. *James Kerr, M.A., M.D.*

Ontario. *The Sanitary Journal of the Provincial Board of Health.* Parts III. and IV. of the Twenty-third Annual Report for the year 1904. 174 pp., 8vo. Toronto, 1905. *Chas. A. Hodgetts, M.D.*

Simpson, *W. J., M.D., F.R.C.P., D.P.H.* A Treatise on Plague, dealing with the historical, epidemiological, clinical, therapeutic, and preventive aspects of the disease. Price 16s. 466 pp., 4to. Cambridge, 1905. *The Author.*

Southport Meteorological Department. *The Fernley Observatory.* Report and Results of Observations for the year 1904. 30 pp., 4to. Southport, 1905. *J. Baxendall, F.R.Met.Soc.*

United States of America. Report of the Commissioner of Education for the year 1903. Vol. I. 1,216 pp., 8vo. Washington, 1905. *The Bureau of Education.*

Wallace, *Sim J., M.D., D.Sc., L.D.S.* The Rôle of Modern Dietetics in the Causation of Disease. 87 pp., 8vo. London, 1905. *Baillière, Tindall, & Cox (Publishers).*

LIST OF EXHIBITS ADDED TO THE MUSEUM.

Electric Light Fittings (Steel Conduit System), mounted on board.
The Simplex Steel Conduit Co., 20, Bucklersbury.

Euboeolith Flooring, laid on concrete in Lavatory, fireproof and jointless; finished with smooth surface for polishing. *J. Percy Day, 3, Victoria St., S. W.*

School Desk and Seat, adjustable. *Illingworth, Ingham, & Co., Leeds.*

Drain Rod Joint (Brass), Lockfast pattern. *Killgerm, Ltd., Cleckheaton, Yorks.*

Bricks, various samples, Asbestic and other mixtures.
The Asbestic Brick and Tile Co., Lodge Place, St. John's Wood, N. W.

Window Fastener, "Lorie" pattern, fitted to model sash; admits of ventilating by fixing in any position. *Avery & Co., Birmingham.*

Slop Shute, Channel Gully, and Trap. The gratings are adjustable to fit any sized pipe and position required. *J. Hirst & Son, Cleckheaton, Yorks.*

Trapped Drainbox for tramway rails, cast iron, bored for connection.
Ames Crosta Engineering Co., Nottingham.

Drain Pipe and Trap Cleaner. "Ferret," spirally wound steel, 3 ft. lengths, 1 in. diameter, with handle and screw connections.
Cakebread, Robey, & Co., Stoke Newington.

Geyser (Copper), with flue pipe and ventilator fitted in Lavatory section.
Ewart & Son, Euston Road.

Drain Pipes, improved type, "Freeman Hines" double seal joints, bitumen collars, with cam action. *Freeman Hines, Ltd., 1, Victoria St., S. W.*

Automatic Flushing Tank (Galvanized Iron). Special design.
J. R. Preston, 3, St. Mary Parade, Lancaster.

Fire Grate. "Heaped Fire" pattern fixed in Council Room, fireclay seating back and sides, sloped outwards, removable grate bottom having no front fire bars. *Bratt, Colbran, & Co., 10, Mortimer Street, W.*

Floor Polish. "Ronuk" applied to various wood blocks in panel.
Ronuk, Limited, Portslade, near Brighton.

Glass. Model window sash, glazed with various pattern fire-resisting glass, 2 stallboard lenses, 1 pavement lense, 1 Luxfer window prism.
The British Luxfer Prism Syndicate, Ltd., 16, Hill St., Finsbury.

SUPPLEMENT.

PARKES MUSEUM NEW PREMISES FUND.

		£	s.	d.
Amount Allotted by Council		9,000	0	0
Contributions and Donations promised 1899–1904		1,101	13	0
Contributions, 1905, already Reported, including Guarantee Fund		1,159	17	0

Contributions since last report.

		£	s.	d.
W. Nisbet Blair	during three years	3	3	0
H. D. Blake	during five years	5	5	0
A. Wynter Blyth	... ...	10	10	0
F. Brittain	... ...		10	6
R. J. Butland	during three years	1	11	6
The Worshipful Company of Carpenters		26	5	0
T. Cassidy	during three years	1	11	6
Davis & Bennett (conditional) ...	... ...	21	0	0
James Felgate (2nd donation) ...	... ...	1	1	0
H. Freyberg	during three years	3	3	0
H. Norman Gray	during four years	2	2	0
The Worshipful Company of Grocers		50	0	0
Jesper Haigh	during four years	1	0	0
T. R. Hooper	... ...	1	1	0
Arthur C. James	during five years	2	12	6
Charles Jones	... ...	5	0	0
Claude King	during three years	3	3	0
L. H. Lee	... ...	2	2	0
G. Lingwood	... ...	2	0	0
Dr. J. Middleton Martin	during ten years	3	10	0
N. B. McDermott	during three years	3	3	0
Ernest G. Mitchell	... ...	1	1	0
J. Reidie	... ...	5	0	0
J. Reidie (2nd donation)	during five years	2	12	6
Dr. E. Sergeant	during five years	5	5	0
A. F. Somerville	during two years	10	0	0
W. Stuart	during three years	3	3	0
J. Sumner	during five years	5	5	0
Dr. Gerard C. Taylor	... ...	1	1	0
Dr. T. W. Thomas	during three years	3	3	0
H. Whale	during five years	2	12	6
W. H. Woolley	during five years	2	12	6
Other Amounts	... ...		9	0

July 25th, 1905.

THE ROYAL SANITARY INSTITUTE.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
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Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

The articles referred to in this list are as far as possible collected and filed in the Library of the Institute for the use of the Members and Associates.

Science in relation to Hygiene and Preventive Medicine.

CREIGHTON, Dr. C. Plague in India. *Journ. Soc. Arts*, Vol. LIII. (1905), No. 2743, p. 810.

Distribution (maps). Recent scientific developments. Sanitary advantages of hamlets. Plague in the cities. Means of avoiding plague. Evacuation of places. Probable future of plague in India. Discussion.

Hygiene of Special Classes, Trades, and Professions: and Municipal Administration.

"BUILDER." New Middlesex County Asylum. 17th June, 1905, p. 651.

Description of buildings and arrangement.

"JOURN. SOC. ARTS." Building Bye-laws and Rural Depopulation. Vol. LIII. (1905), No. 2721, p. 182.

General. See also T. B. Phillips, No. 2722, p. 225, and No. 2724, p. 284.

WATERHOUSE, PAUL, F.R.I.B.A. University College Hospital, Medical School, and Nurses' Home. *Builder*, 17th June, 1905, p. 656.

Plan, description, perspective view.

Water Supply, Sewerage, and Refuse Disposal.

GERHARD, W. P. The water supply of country buildings. *Cassier's Magazine*, Vol. 27 (1905), No. 6, p. 482; Vol. 28, No. 1 and 2, pp. 63 and 135.

General considerations (batteries of wells, hotel in White Mountains). Details. Storage and distribution.

LATHAM, FRANK. The water supply of Penzance, and the hydro-geology of Cornwall. *Trans. Brit. Assoc. Waterworks Eng.*, Vol. IX. (1905), p. 292.

Moorland-water, well-water, etc. Discussion.

LEATHER, Dr. J. W. Abstract of a report on the water of the soil. *Journ. Soc. Arts*, Vol. LIII. (1905), No. 2744, p. 838.

LEMMOIN-CANNON, H. Sewage and its disposal. *Technics*, Vol. IV. (1905), No. 19, p. 65.

Conservancy, water carriage, and chemical system. Sludge. Effluent.

MIDDLETON, R. E. Administration and control of the nation's water supply. *Trans. Brit. Assoc. Waterworks Eng.*, Vol. IX. (1905), p. 91.

Counties. Water areas. Boroughs and urban districts. Rural districts. Proposed new authorities. Underground water. Waste of water. Discussion.

MITCHELL, GEORGE. The Appleton extensions of the Warrington Waterworks. *Trans. Brit. Assoc. Waterworks Eng.*, Vol. IX. (1905), p. 272.

Improvement of old filters (water used only for trade purposes). Discussion.

SMITH, C. C., and CHAPLIN, DR. E. M. The treatment of moorland water to prevent action upon lead pipes. *Trans. Brit. Assoc. Waterworks Eng.*, Vol. IX. (1905), p. 184, pt. vi. *a.*

Refers to the Wakefield supply. Treatment with carbonate of soda, by sand filtration, and by the addition of chalk or lime. Discussion.

SPELLER, F. N. Failure of wrought-iron water-pipe through corrosion. *Engineering Record*, 10th June, 1905, p. 654.

Description of 3-inch extra strong wrought-iron pipe that failed by corrosion in one year. Examination and analogies showed it to be probably due to decomposing sewage matter.

THRESH, DR. J. C. The water supply to the rural districts of Essex. *Report to the County Council*, p. 95, 7 maps. Chelmsford: 1905.

An account of the rural district of the County, and of the water supplies of their component parishes, with suggestions for improvements.

——— The practical definition of "pure and wholesome water" and "pollution." *Trans. Brit. Assoc. Waterworks Eng.*, Vol. IX. (1905), p. 113.

WHITAKER, W. Well-sections in Cambridgeshire. *Rep. Brit. Assoc. for 1904*, 1905, p. 266.

References to published accounts. Details of twenty-one well-sections, not before published.

Heating, Lighting, and Ventilating.

"BUILDER." Smoke-abatement regulations in foreign countries. 8th July, 1905, p. 41.

Extracts from reports received by the Secretary of State for Foreign Affairs, and includes Austria, Bavaria, Belgium, France, Germany, Hungary, Italy, Netherlands, Saxe-Coburg and Gotha, Saxony, Switzerland, and United States.

MEIER, KONRAD. Some features of indirect heating. *Engineering Record*, 27th May, 1905, p. 606.

Calculations in connection with heating by warmed air.

MEETINGS HELD.

EXAMINATIONS.

Sanitary Science as applied to Buildings and Public Works.

July 21 and 22. Cardiff. 7 Candidates; 2 Certificates granted.

Inspectors of Nuisances.

July 21 and 22. Cardiff. 70 Candidates; 34 Certificates granted.

CANDIDATES WHO HAVE RECEIVED CERTIFICATES.

Sanitary Science as applied to Buildings and Public Works.

RUSSELL, CHARLES TUDOR. WILLIAMS, DANIEL THOMAS.

Inspectors of Nuisances.

ALLEN, FRANCIS JOHN.
BELL, GUSTAVUS.
BICKNELL, WILLIAM BIDGOOD.
CHANT, FREDERICK CHARLES.
CLAYTON, ARTHUR.
CLIFFORD, FRANK.
EVANS, JAMES.
EVANS, JOHN.
FOSTER, HERBERT LIONEL JENKIN.
GELLY, DAVID.
GIBBON, EDWARD FREDERICK.
GIBBON, FREDERICK.
GOTTEREL, LUCY EDITH.
GRAY, JOHN.
GREEN, GEORGINA MAUD.
HAMLYN, FREDERICK CHARLES.
HOWELL, EDMUND GEORGE.
HOWELL, FREDERICK PERCY.
HUNKIN, HARRY.
KINGWELL, ERIC GARFIELD.
LEWIS, OWEN MEREDITH.
MUGFORD, JOHN SIDNEY.
NICHOLAS, WILLIAM.
PARSONS, REGINALD RIDGMAN.
PEARCE, WILLIAM GEORGE.
RAMSDEN, SARAH ALICE.
REES, PHILIP.
ROBINSON, WILFRED MARTIN.
SAUNDERS, ERNEST VICTOR.
SMALE, WILLIAM LEWIS BRANSCOMBE.
STEVEN, DORA.
STEWART, ALEXANDER BRECHIN.
WILLIAMS, ERNEST WILLIAM.
WINTER, FRANK ERNEST.

FORTHCOMING MEETINGS.

A CONFERENCE ON SMOKE ABATEMENT AND EXHIBITION OF SMOKE APPLIANCES

Has been arranged by the Institute, in conjunction with the Coal Smoke Abatement Society, to be held in London, at the Horticultural Hall, Westminster, on December 12th to 15th, 1905.

The Meetings of the Conference will be arranged as follows:—

TUESDAY EVENING, DECEMBER 12TH.

Lecture to the Conference.

WEDNESDAY, DECEMBER 13TH.

SUBJECT, 11 a.m.: "Domestic Smoke Abatement."

THURSDAY, DECEMBER 14TH.

SUBJECT, 11 a.m.: "Factory and Trade Smoke Abatement."

FRIDAY, DECEMBER 15TH.

SUBJECT, 11 a.m.: "Administration, Legislation, and necessary reforms."

An Exhibition of Smoke Appliances will be held in connection with the Conference.

SESSIONAL MEETINGS.

The following arrangements have been made:—

York, October 7th. "Some Aspects of the Pure Milk Problem from Within," by C. W. Sorensen (of the White Rose Dairy Farm, formerly

Chief Dairy Expert to the New Zealand Government). Visits to White Rose Model Dairy, New Earswick Model Cottages, and Huxley Road Cocoa Works. Members will be entertained at Tea by the Lord Mayor.

Northampton, Saturday, November 4th.

Lectures to Sanitary Officers.

The Fortieth Course of Lectures and Demonstrations to Sanitary Officers will commence on Tuesday, September 19th. The Lectures are arranged to include the subjects scheduled for the examination for Inspector of Nuisances held by The Royal Sanitary Institute and the Sanitary Inspectors' Examination Board (formed by The Sanitary Institute and other bodies).

Lectures on Sanitary Science as applied to Buildings and Public Works.

A Course of Lectures has been arranged to assist those desiring instruction in Sanitary Science as applied to Buildings and Public Works, suitable to Foremen of Works, Builders, and those engaged in Allied Trades, Managers of Property, Teachers and Lecturers, and others who are desirous of obtaining the Certificate of the Institute in Sanitary Science as applied to Buildings and Public Works.

Inspections and Demonstrations are arranged, and include visits to Disinfecting Stations, Municipal Depôts, Artizans' Dwellings, Waterworks, Sanitary Works in Progress, Refuse and Sewage Disposal Works, etc., etc., and other Public and Private Works illustrative of Sanitary Practice and Administration.

The Course will commence on September 23rd.

Course of Practical Training for Meat Inspectors

suitable for candidates preparing for the Examination for Inspectors of Meat and Other Foods, conducted by The Royal Sanitary Institute.

The Sixth Course will commence on September 29th, and will consist of systematic Practical Training in the inspection of meat at a Cattle Market, including Demonstration on live cattle and sheep, slaughtering and dressing of animals, names and situations of the organs, diseases of animals, methods of stalling, arrangements of markets and byres, etc.

Demonstration will also be arranged at a knacker's yard, where instruction regarding the flesh and organs of the horse will be given.

The Course will continue for two months.

Demonstration will be given at the Institute on Friday evenings and at a Market on Saturday afternoons.

In addition to the practical training at a Market, the Course will include the Lectures on Meat and Food Inspection given in the Parkes Museum.

Special Course on Food and Meat Inspection.

Third Special Course of Practical Training in Food and Meat Inspection for Commissioned Officers and Professional Students preparing for the Examination for Inspection of Meat and Other Foods, conducted by The Royal Sanitary Institute, will commence on November 22nd, 1905.

Congress, 1906.

An invitation from an influential Local Committee, presided over by Dr. Colston Wintle, Chairman of the Health Committee of the City of Bristol, to hold the next Congress and Exhibition of the Institute in that City in 1906, has been accepted by the Council, and it has been arranged that the Congress shall meet in July.

The dates and subjects of the Lectures and Demonstrations in each Course are given month by month in the Calendar.

Calendar, September and October, 1905.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesday in each Month at 5 p.m.

Exhibition Committee . . . Congress and Editing Committee	Monday in the week preceding the Council, at 4.30 p.m. & 5.30 p.m.
Examination Committee . . Museum and Library Committee	Tuesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Special Purposes Committee . Finance Committee . . .	Wednesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Parliamentary Committee . New Premises Committee . Disinfectant Standardisation Committee	As occasion requires.

The Parkes Museum is open free, on Mondays 9.30 a.m. to 8 p.m., other days 9.30 a.m. to 5.30 p.m. The Library and Office are closed at 1 p.m. on Saturdays.

Council and Committee Meetings are suspended during August and September, and the Museum and Library are closed on Public Holidays.

SEPTEMBER.

19 T. Lecture to Sanitary Officers at 7 p.m. Sanitary Law, A: Introductory Remarks, Public Health Acts—English, Scotch, Irish; other Statutes relating to Public Health; By-laws (Model, etc.), Regulations, Orders, Memoranda, etc., by J. Priestley, B.A., M.D., M.R.C.S., D.P.H.

20 W. Lecture to Sanitary Officers at 7 p.m. Sanitary Law, B: Public Health (London) Act; Metropolis Local Management Acts; By-laws and Regulations in force in the Administrative County of London, by J. Priestley, B.A., M.D., M.R.C.S, D.P.H.

22 F. Lecture to Sanitary Officers at 7 p.m. Sanitary Law, C: Factory and Workshop Acts (including Bakehouse Legislation, 1878-95) as they affect the Sanitary Inspector; Smoke Legislation; Food and Drugs Acts, 1899, by J. Priestley, B.A., M.D., M.R.C.S., D.P.H.

23 S. Inspection and Demonstration at Wimbledon Sewage Works, at about 2.45 p.m. Conducted by C. H. Cooper, M.INST.C.E., Engineer and Surveyor to District Council.

25 M. Lecture to Sanitary Officers at 7 p.m. Duties of a Sanitary Inspector—General, A: Outdoor, by G. Newman, M.D., D.P.H., F.R.S.E., Medical Officer of Health, Finsbury.

27 W. Lecture to Sanitary Officers at 7 p.m. Duties of a Sanitary Inspector—General, B: Indoor, by G. Newman, M.D., D.P.H., F.R.S.E., Medical Officer of Health, Finsbury.

27 W. Inspection and Demonstration in the District of Islington, at 2 p.m. (number limited). Conducted by James R. Leggatt, Supt., Public Health Dept., Borough of Islington.

29 F. Lecture to Sanitary Officers at 7 p.m. Duties of a Sanitary Inspector—C: Offensive Trades and Trade Nuisances, etc., by G. Newman, M.D., D.P.H., F.R.S.E., Medical Officer of Health, Finsbury.

29 F. Demonstration—Meat Inspectors Course.

30 S. Inspection and Demonstration at the Southwark and Vauxhall Water Works, Hampton, at about 2.30 p.m.

OCTOBER.

2 M. Lecture to Sanitary Officers at 7 p.m. Infectious Diseases, by A. Wellesley Harris, M.R.C.S., D.P.H.

4 W. Lecture to Sanitary Officers at 7 p.m. Methods of Disinfection, by A. Wellesley Harris, M.R.C.S., D.P.H.

4 W. Inspection and Demonstration at John Knight & Sons' Soap Works, Silvertown, at 3 p.m.

5 Th. Demonstration of Book-keeping as carried out in a Sanitary Inspector's Office, at the Public Health Office, Town Hall, Upper St., Islington, N., at 7 p.m., by James R. Leggatt, Supt., Public Health Dept., Borough of Islington.

6 F. Lecture to Sanitary Officers at 7 p.m. Elementary Statistics, by A. Wellesley Harris, M.R.C.S., D.P.H.

7 S. **Sessional Meeting**, at 11 a.m., York. Discussion on "Some Aspects of the Pure Milk Problem from Within," to be opened by C. W. Sorensen (of the White Rose Dairy Farm, formerly Chief Dairy Expert to the New Zealand Government).

7 S. Inspection and Demonstration at the Sewage and Destructor Works, Ealing, at 2.15 p.m. Conducted by Charles Jones, M.INST.C.E., Borough Engineer and Surveyor.

7 S. Demonstration—Meat Inspectors Course.

11 W. Lecture to Sanitary Officers at 7 p.m. Elementary Physics, by E. J. Steegmann, M.B., M.R.C.S., D.P.H.

11 W. Inspection and Demonstration in the District of Islington, at 2 p.m. (number limited). Conducted by James R. Leggatt, Supt., Public Health Dept., Borough of Islington.

12 Th. Lecture to Sanitary Officers at 7 p.m. Elementary Physics, by E. J. Steegmann, M.B., M.R.C.S., D.P.H.

13 F. Lecture to School Teachers, at Bedford College, at 4.45 p.m., by Miss Morton.

13 F. Demonstration—Meat Inspectors Course.

13 F. Lecture to Sanitary Officers at 7 p.m. Elementary Chemistry, by E. J. Steegmann, M.B., M.R.C.S.. D.P.H.

13 F. } Examination in Practical Sanitary Science as applied to Buildings and Public
14 S. } Works, and for Inspectors of Nuisances, Liverpool.

14 S. Inspection and Demonstration at the Aylesbury Dairy Company's premises, St. Petersburgh Place, Bayswater, W., at 2.30 p.m.

16 M. Lecture to Sanitary Officers at 7 p.m. Elementary Chemistry and Meteorology, by E. J. Steegmann, M.B., M.R.C.S., D.P.H.

16 M. Demonstration on Building Materials and Construction in the Parkes Museum, at 6 p.m., by the Director, E. White Wallis, F.S.S.

18 W. Lecture—Sanitary Science Course, at 7 p.m. Analysis of Air and Water, by E. J. Steegmann, M.B., M.R.C.S., D.P.H.

18 W. Inspection and Demonstration in the District of Islington, at 2 p.m. (number limited). Conducted by James R. Leggatt, Supt., Public Health Dept., Borough of Islington.

18 W. Demonstration on Baths and Lavatories in the Parkes Museum, at 6 p.m.

20 F. Lecture to Sanitary Officers at 7 p.m. Calculations, Measurements, and Plans and Sections, by W. C. Tyndale, M.INST.C.E.

20 F. Lecture to School Teachers, at Bedford College, at 4.45 p.m., by Miss Morton.

20 F. } Examination in Practical Sanitary Science as applied to Buildings and Public
21 S. } Works, and for Inspectors of Nuisances, and in Hygiene in its bearing on School Life, Leicester.

21 S. Demonstration—Meat Inspectors Course.

21 S. Inspection and Demonstration at the Lambeth Disinfecting Station, at 2.30 p.m, Conducted by J. Priestley, M.D., D.P.H., Medical Officer of Health, Lambeth.

23 M. Lecture to Sanitary Officers at 7 p.m. Building Materials, by A. Saxon Snell. F.R.I.B.A.

23 M. Demonstration on Waste Preventers and Water Closets in the Parkes Museum, at 6 p.m.

24 T. Demonstration—Meat Inspectors Course.

25 W. Lecture to Sanitary Officers at 7 p.m. Sanitary Building Construction, by A. Saxon Snell, F.R.I.B.A.

25 W. Inspection and Demonstration in the District of St. Pancras, at 3 p.m. (number limited). Conducted by W. G. Auger, Sanitary Inspector.

25 W. Demonstration on Pipe Joints, etc., and Drain-testing Appliances, in the Parkes Museum, at 6 p.m.

27 F. Lecture—Sanitary Science Course, at 7 p.m. Sanitary Building Construction (Advanced), by A. Saxon Snell, F.R.I.B.A.

27 F. Lecture to School Teachers at 4.45 p.m., by Miss Morton.

27 F. } Examination for Inspectors of Meat and other Foods, Cardiff.
28 S. }

28 S. Inspection and Demonstration at the Camberwell Infirmary, Brunswick Square, Peckham Road, S.E., at 2.15 p.m. Conducted by Edwin T. Hall, V-P.R.I.B.A.

30 M. Lecture to Sanitary Officers at 7 p.m. Sanitary Appliances, by W. C. Tyndale, M.INST.C.E.

CONTRIBUTIONS AND ADDITIONS TO LIBRARY

*** *For publications of Societies and Institutions, etc., see under "Academies."*

ACADEMIES (AMERICAN).

United States of America. *The Ontario Association of Architects.* Proceedings for 1904–5. 126 pp., 8vo. Toronto, 1905. *The Association.*

ACADEMIES (BRITISH).

London. *The Institution of Mechanical Engineers.* Proceedings, July—December, 1904. 336 pp., 8vo. London, 1905. *The Institution.*

——— *Society of Engineers.* Transactions for the Year 1904 and General Index, 1857 to 1904. 276 pp., 8vo. London, 1905. *The Society.*

Berne. Résultats Statistiques du Recensement Fédéral du 1er Decembre, 1900. Deuxième Volume. 406 pp., 4to. Berne, 1905. *The Bureau.*

Board of Agriculture and Fisheries. Agricultural Statistics, 1904. Report on the Agricultural Returns relating to Acreage and Produce of Crops, and Number of Live Stock in Great Britain. 290 pp., 8vo. London, 1905. *The Board.*

Budapest. Székes Főváros Statisztikai Evkönyve v. évfolyam, 1902, szerkesztette Dr. Thirring Gusztâv. 300 pp., 4to. Budapest, 1904. *The Author.*

Dublin. *Department of Agriculture and Technical Instruction for Ireland.* Report of the Director, Institutions of Science and Art, Dublin, for the Year ending 31st March, 1904. 38 pp., 8vo. Dublin, 1905. *The Director.*

Hamburg. Bericht des Medizinalrates über die Medizinische Statistik des Hamburgischen Staates für das Jahr, 1904. 108 pp., 4to. Hamburg, 1905. *Dr. Wahncau.*

Howrah Municipality. Administration Report for 1904—1905. *A. Hale (Engineer and Surveyor).*

Japan. Annual Report of the Health of the Imperial Navy for the Year 1902. 153 pp., 8vo. Tōkyō, 1905. *The Chief of Bureau of Medical Affairs.*

MEDICAL OFFICERS OF HEALTH AND OTHER SANITARY REPORTS.

Aberdeen, April, 1905	*Matthew Hay, M.D.*
Aberdeen, May, 1905	*Matthew Hay, M.D.*
Aberdeen, June, 1905	*Matthew Hay, M.D., M.B.*
Ashwell, 1904	*B. Anningson, M.D., M.A.*
Bermondsey, 1904	*R. K. Brown, B.A., M.D., D.P.H.*
Birkenhead, 1904	*R. Sydney Marsden, D.Sc., M.D., D.P.H.*
Birmingham, 1904	*J. Robertson, M.D., B.Sc.*
Bournemouth, 1904	*P. W. G. Nunn, L.R.C.P., M.R.C.S.*
Cambridge, 1904	*B. Anningson, M.D., M.A.*
Cardiff, 1904	*E. Walford, M.D., D.P.H.*
Carnarvonshire C.C., 1904	*P. Fraser, M.D., B.Sc.*
Cheshire C.C., 1904	*F. Vacher, F.R.C.S., M.R.C.P.*

Chesterfield, 1904	*H. Peck, M.D., D.P.H.*
Chesterton R.D., 1904	*B. Anningson, M.D., M.A.*
Chesterton U.D., 1904	*B. Anningson, M.D., M.A.*
Coventry, 1904	*E. H. Snell, M.D., B.Sc., F.R.S.Ed.*
Darwen, 1904	*F. G. Haworth, M.B., C.M., D.P.H.*
Derby, 1904	*W. J. Howarth, M.D., D.P.H.*
Dumbarton C.C. (San. Insp.), 1904..	*D. Dunbar.*
East Ham, 1904	*A. W. Beaumont, B.A., M.D.*
Edinburgh, 1904	*A. Maxwell Williamson, M.D., B.Sc.*
Ely, 1904	*B. Anningson, M.D., M.A.*
Gorton, 1904	*A. W. Martin, L.R.C.P., D.P.H.*
Greenwich, 1904	*E. G. Annis, L.R.C.P., D.P.H.*
Huddersfield, 1st quarter, 1905 ..	*S. G. Moore, M.B., D.P.H.*
Kensington, 1904	*T. Orme Dudfield, M.D.*
King's Norton and **Northfield**, 1904.	*R. Green, M.D., D.P.H.*
Lanark C. C. 1904	*John T. Wilson, M.D., D.P.H.*
Lewisham, 1904	*A. Wellesley Harris, M.R.C.S., D.P.H.*
London (**City of**), 1904; five weeks ending April 22nd, 1905. and three weeks ending 13th May, 1905. No. 81	*W. Collingridge, M.A., M.D., D.P.H.*
London (**City of**), five weeks ending 17th June, 1905, No. 82; five w'ks ending 15th July, 1905, No. 83 ..	*W. Collingridge, M.D., D.P.H.*
London (**Port of**), 1904	*H. Williams, M.D., D.P.H.*
Lowestoft, 1904	*A. Marshall, M.D., D.P.H.*
Maidstone (San. Inspector's), 1904 ..	*W. Jackling.*
Melbourn, 1904	*B. Anningson, M.D., M.A.*
Newcastle-upon-Tyne, 1904 ..	*H. E. Armstrong, D.Hy., M.R.C.S.*
Northamptonshire C.C.	*C. E. Paget, L.R.C.P., D.P.H.*
Northampton, 1904	*J. Beatty, M.A., M.D., D.P.H.*
Nottinghamshire C.C., 1904 ..	*H. Handford, M.D., F.R.C.P., D.P.H.*
Paddington, 1904	*R. Dudfield, M.A., M.B., D.P.H.*
Poplar, 1904..	*F. W. Alexander, M.R.C.S., D.P.H.*
Preston, 1904	*H. O. Pilkington, M.R.C.S., M.O.H.*
Pudsey, 1904	*W. L. Hunter, M.D., D.P.H.*
Ribble Joint Committee, 1904 ..	*E. Halliwell.*
Royston, 1904	*B. Anningson, M.D., M.A.*
Shanghai, 1904	*A. Stanley, M.D., D.P.H..*
St. Helens, 1904	*J. J. Buchan, M.B., D.P.H.*
Swindon, 1904	*F. E. Streeten, D.P.H., M.R.C.S.*
St. Ives, 1904	*B. Anningson, M.D., M.A.*
Stepney, 1904	*D. L. Thomas, M.R.C.S., L.R.C.P., D.P.H.*
Stockport, 1904	*Meredith Young, M.D., D.P.H.*
Surrey C.C., 1904	*E. C. Seaton, M.D., M.B., F.R.C.P.*
Swavesey, 1904	*B. Anningson, M.D., M.A.*
Torquay (San. Insp.), 1904	*Chas. MacMahon, Chief San. Insp.*
Warwickshire C.C., 1904	*A. Bostock Hill, M.D., D.P.H.*
Westminster, 1904	*F. J. Allan, M.D., D.P.H., F.R.S.Edin.*
Woolwich, 1904	*S. Davies, M.D., D.P.H.*

Mill, *H. R., D.Sc., LL.D., F.R.S.E.* On the Distribution of Rain over the British Isles during the year 1904, as observed at about 4,000 stations in Great Britain and Ireland, with Articles upon various branches of Rainfall work. 279 pp., 8vo. London, 1905. *The Author.*

Smith, *Col. F., C.M.G., F.R.C.V.S.* A Manual of Veterinary Hygiene. Third Edition. 1,035 pp., 8vo. London, 1905. *The Author.*

United States of America. *Department of the Interior.* A Review of the Laws forbidding Pollution of Inland Waters in the United States, by E. B. Goodell. 120 pp., 8vo. Washington, 1904. *W. Whitaker, B.A., F.R.S.*

——— Report of the Commissioner of Education for the year 1903. Vol. II. 1,294 pp., 8vo. Washington, 1905. *The Commissioner.*

Woodward, *H. B., F.R.S.* (i.) Report on the Wells and Sewage Farms on the War Department Land on Salisbury Plain. (ii.) Report on Sewage Disposal in the Salisbury Plain District, by Lieut.-Col. A. M. Davies, R.A.M.C., and W. C. Tyndale, M.Inst.C.E. 31 pp., fcp. London, 1904. *W. C. Tyndale, M.Inst.C.E.*

York. Report upon the Proposal for a Housing Investigation, by E. M. Smith, M.D., D.P.H., Medical Officer of Health. 31 pp., 8vo. York, 1905. *The Author.*

In addition to the books presented to the Library, the following works connected with Sanitary Science have been published:—

Allan, *Taylor A.* New Streets: Laying out and Making-up. London: Sanitary Publishing Co.

Anderson, *Wallace J., M.D.Glasg.,* and **Edington,** *George H., M.D.Glasg.* Home Nursing and Hygienic Handbook. Glasgow: St. Andrews Ambulance Association.

Booth. *W. H.* Steam Pipes: Their Design and Construction. London: A. Constable & Co.

Briggs, *Wm.* Building Construction. London: University Tutorial Press.

Buchanan, *Major, M.A., M.D.* Malarial Fevers and Malarial Parasites in India. Second Edition. London: W. Thacker & Co.

Burnet, *R. W., M.D., F.R.C.P.* Foods and Dietaries. London: C. Griffin & Co.

Burton-Fanning, *F. W., M.D.Cantab.* The Open-Air Treatment of Pulmonary Tuberculosis. London: Cassell & Co.

Forward, *Charles W.* The Food of the Future. London: George Bell & Sons.

Friedenwald, *Julius, M.D.* Diet in Health and Disease. London: W. B. Saunders & Co.

Giles, *Lt.-Col. G. M., M.B., F.R.C.S.* Climate and Health in Hot Countries. London: John Bale, Sons, and Daniellson.

Glaister, *John, M.D., D.P.H., F.F.P.S.* Manual of Hygiene for Students and Nurses. Edinburgh: E. & S. Livingstone.

Howard, *Robert, M.B., B.Ch.Oxon.* Five Years' Medical Work on Lake Nyassa. London: The Universities Mission to Central Africa.

Latham, *Arthur, M.A., M.D.Oxon., F.R.C.P.* The Diagnosis and Modern Treatment of Pulmonary Consumption. London: Baillière, Tindall, & Cox.

Laxton, *Wm.* Laxton's Price-book for Architects, Builders, Engineers, and Contractors.

MacDonald, *A. E., M.D., LL.B.* Tent Treatment for the Tuberculous Insane. Published by Charity Organisation Society of New York and National Association for the Study and Prevention of Tuberculosis.

McLean, *J. C. Russell, M.D., D.P.H.* Rural Water Supplies. London: Sanitary Publishing Co.

Nicholson, *W.* Practical Smoke Prevention. London: Sanitary Publishing Co.

Robson, *A. W. Mayo, D.Sc., F.R.C.S.* Cancer and its Treatment. London: Baillière, Tindall, and Cox.

Spinks, *Wm., Assoc.M.Inst.C.E.* Drainage of Villages. London: Sanitary Publishing Co.

Storey, *J.* Zymotic Inquiry Book. London: Sanitary Publishing Co.

Taylor, *Samuel, F.S.I.* Modern Homesteads. London: Land Agents' Record Office.

Wilcox, *R. W., M.A., M.D., LL.D.* A Manual of Fever Nursing. London: Rebman, Ltd.

Wright, *John.* The Home Mechanic. London: John Murray.

LIST OF EXHIBITS ADDED TO THE MUSEUM.

Bath (waste end section). Vit-enamel, level-handle supply valves, detachable waste.

Mixing Valve for bath supply. Brass, with regulating plate and loose aluminium handle. *Doulton & Co., Lambeth.*

Canvas Hose. Double wire-bound, $1\frac{1}{4}$ in. dia., suitable for suction or delivery; screw connections of special manufacture.
W. H. Willcox & Co., Ltd., 20, *Southwark Street.*

Commode and Bidet. Glazed earthenware, reversible, air-tight cover, loose wooden seat. *G. Jennings & Co., Ltd., Lambeth.*

Concrete Flooring. Fire-resisting, sample panel shewing steel corrugated bar reinforcing concrete.
Hodkin & Jones, Ltd., Havelock Bridge Works, Queen's Road, Sheffield.

Plumbing. Cast-lead soil-pipes, junctions, traps, terminals, tacks, sockets; brass screw connections to lead; iron pipe connections to soil-pipes; branches.
Claughton Bros., Lead Works, Bramley, near Leeds.

Rubber Tiling. Interlocking, set in framed panel; and loose tiles, showing construction and design.
H. L. Gibson & Co., 19-20, *Tower Street, Upper St. Martin's Lane, W.C.*

PARKES MUSEUM NEW PREMISES FUND.

	£	s.	d.
Amount Allotted by Council	9,000	0	0
Contributions and Donations promised 1899–1904	1,101	13	0
Contributions, 1905, already Reported, including Guarantee Fund	1,351	15	6

Contributions since last report.

		£	s.	d.
John Anderson		1	1	0
H. Bland	during five years	2	12	6
Sir Charles A. Cameron		2	0	0
The Worshipful Company of Clothworkers ...		25	0	0
The Corporation of Wigan		10	0	0
R. A. Evers	during five years	2	12	6
J. Franklin	during four years	2	2	0
D. W. Herbert	during five years	5	5	0
P. G. Jacobs	during four years	3	16	0
W. Kirkup	during five years	2	12	6
H. B. Norton		5	0	0
A. P. Samy		2	0	0
J. T. Wicks		2	2	0
Winser & Co., Ltd.		10	10	0

GENERAL NOTES.

CONGRESS, 1906.

A public meeting was held on August 3rd, 1905, in the Crown Court of the Guildhall, Bristol, in connection with the proposal to invite The Royal Sanitary Institute to hold its annual Congress in Bristol next year.

There was a representative attendance, and Dr. Colston Wintle was unanimously invited to preside over the meeting.

THE CHAIRMAN said they had met to consider the advisability of inviting The Royal Sanitary Institute to visit Bristol during the year 1906. Most of them knew as well as he could tell them of the very good work the Institute had carried on for a number of years, but he believed it had never visited Bristol for the purpose of holding one of its congresses there. It was thought that it would be a very good thing for the city to formally invite the Institute to meet in that city next year. It was for them to decide as to the advisability or otherwise of so doing. He need not tell them of the advantage such a Congress would give them in Bristol, both from an educational and a business point of view. It was of very great importance that, having the care of the health of such a large number of people, they should be kept up to date in sanitary and allied sciences, and the interchange of views which would be brought about by the Congress could not but be of benefit to the city. It was well for them to show the people of England that they had a spot worthy of visiting, and that when they went there as visitors Bristolians were ever ready to give them a hearty welcome.

MR. T. J. MOSS-FLOWER said that The Royal Sanitary Institute had been in existence for many years, and had held congresses in twenty of their largest towns, ten of which he had attended himself, and he had always realised the importance of the gathering from an educational point of view. It occurred to him that it would be an excellent thing if they could induce the Institute to come to Bristol next year to hold its annual Congress, and he had every reason to believe that if a cordial invitation was sent it would be accepted. Having regard to the fact that a Health Exhibition would be held in conjunction with the Congress, the tradesmen of the city were most anxious that the Institute should visit Bristol and hold its Exhibition, because it would afford an excellent opportunity—outside the educational advantages arising from the visit of the Congress—of bringing their wares before users all over the British Empire. From that point of view it would be a misfortune if they could not get the Congress to come to their city.

ALDERMAN C. J. LOWE moved: "That an invitation be sent in the name of the city for the Institute to visit Bristol in July, 1906."

DR. CHARLES HAYMAN seconded the motion.

The suggestion was cordially approved, and Mr. Moss-Flower expressed his willingness to do what he could to further the project.

SECOND INTERNATIONAL CONGRESS ON SCHOOL HYGIENE,

LONDON, AUGUST 5TH TO 10TH, 1907.

President:
SIR LAUDER BRUNTON, LL.D., M.D., D.Sc., F.R.C.P., F.R.S.

Chairman of Organising Committee:
SIR EDWARD BRABROOK, C.B., M.A., F.S.A.

Treasurer:
R. BIDDULPH MARTIN, M.P.

Honorary General Secretaries:
JAMES KERR, M.A., M.D., D.P.H.
E. WHITE WALLIS, F.S.S.

A movement has been greatly extended during the last few years in every civilised country, and not least in English speaking lands, for attention to all that makes for the health and efficiency of the human race, and particularly to the foundation of good citizenship in healthy infancy, and sound school life.

In Great Britain the Education Laws have been revised and supplemented in the direction of hygienic development; Royal Commissions have inquired into mental conditions; Parliamentary Inquiries and Departmental Committees have dealt with questions of physical degeneration; numerous societies dealing with childhood, child study, parental obligation, hygiene and allied subjects have been steadily at work, and the British Association for the Advancement of Science has created a section for Educational Science, and has appointed Special Committees to inquire into conditions of health in schools.

In other countries a similar movement has been going on. It is realised that civilisation means a continually increasing complexity of life, and that, therefore, education is a necessity for all, and must be made as hygienic as possible.

This means that scientific methods must be carefully followed out in schools, even in treating the youngest scholars; brains must no be overtaxed, weakened frames must be strengthened by scientific bodily training, and the successful development of the race ensured, by promoting the good health of its children especially during their school life.

Fully convinced that the ends of school hygiene will be essentially facilitated and advanced by the united efforts of all civilised peoples, the representatives of various European societies have formed an international committee to hold triennial Congresses on school hygiene. The following Societies have united for this purpose:—for Germany, the Allgemeine Deutsche Verein fur Schulgesundheitspflege, with its local groups; for Great Britain, the Society of Medical

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Officers of Schools; for France, the Ligue des Médecins et des Familles; for Switzerland, the Schweizerische Gesellschaft fur Schulgesundheitspflege; for Belgium, the Paedologisch Gezelschap in Antwerpen; for the Netherlands, the Vereeniging tot Vereenvoudiging van Examens en Onderwijs; and for Hungary, the Fachkomitee der Schulartze und Professoren der Hygiene.

The first Congress was held at Nuremberg in Easter week, 1904. It was attended by about fifteen hundred delegates representing almost every civilised state. The influence of this Congress has already made itself felt in many countries in the literature, laws, and regulations connected with health and education.

It was deemed appropriate that the great educational and hygienic movement going on in the British Empire should be acknowledged, and the Congress therefore decided that their next meeting should be in London during August 5th–10th, 1907, under the Presidency of Sir Lauder Brunton.

Probably the succeeding meeting will be held in France in 1910.

The great success of the first Congress was made possible by numerous local committees which were organised in about one hundred towns of Central and Northern Europe, and these committees sent delegates to the meeting. The transactions of the Congress, in four volumes, have been issued, containing all the papers and discussions, and forming the most recent and comprehensive literature on school hygiene in existence.

Exhibition.

In order to practically illustrate, as far as possible, the matters coming under the consideration of the Congress in London, an Exhibition will be organised, at which the planning, construction, and equipment of school buildings will be illustrated, and school furniture and teaching appliances of all kinds shown.

The Exhibition will be so arranged as to illustrate the whole range of school hygiene, both historically and according to everyday practice.

The Exhibition will be organised by The Royal Sanitary Institute, and it is hoped that many exhibits will be sent by the English Colonies and other countries, so that those present at the Congress may have the opportunity of comparing the construction and equipment of schools in various countries.

Local Committees.

Local committees are now being formed in numerous centres all over the world to promote the success of the Congress in London.

Regulations for the London Congress, 1907.

Every person interested in promoting the hygiene of school life is eligible for membership, upon furnishing the local committee with an exact statement of his or her name, position, title, and address, and paying the subscription of one guinea, or five dollars. A card of membership will be issued entitling the holder to attend all meetings, discussions, and entertainments, to receive the literature and proceedings, and to enjoy all other privileges of the Congress.

THE ROYAL SANITARY INSTITUTE.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
Hygiene of Special Classes, Trades, and Professions; and Municipal Administration.
Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

The articles referred to in this list are as far as possible collected and filed in the Library of the Institute for the use of the Members and Associates.

Building Materials, Construction, and Machinery.

HUMPHREY, RICHARD L. The Investigation of Structural Materials by the United States Geological Survey. *Engineering Record*, 12th Sept., 1905, p. 270.

Description of the organization of the various departments and the work that is being carried out.

Water Supply, Sewerage, and Refuse Disposal.

EWELL, Dr. A. W. Ozone for Water Purification. *Engineering Record*, 2nd Sept., 1905, p. 260.

Summary of paper contributed to the "Electrical World and Engineer" upon the various methods employed for the purification of water by ozone.

"ENGINEERING RECORD." Sanitation in Manila. 15th July, 1905, p. 76.

Description of the foul arrangements during the Spanish regime, and their gradual amelioration since the American occupation.

——— The Significance of Analyses of Effluents from Sewage Works. 5th Aug., 1905, p. 162.

Lengthy abstract of paper, by Mr. Earl B. Phelps, in the Technology Quarterly for June.

FORTHCOMING MEETINGS.

A CONFERENCE ON SMOKE ABATEMENT AND EXHIBITION OF SMOKE ABATEMENT APPLIANCES

Has been arranged by the Institute, in conjunction with the Coal Smoke Abatement Society, to be held in London, at the Horticultural Hall, Westminster, on December 12th to 15th, 1905.

The Meetings of the Conference will be arranged as follows:—

TUESDAY EVENING, DECEMBER 12TH.

Lecture to the Conference.

WEDNESDAY, DECEMBER 13TH.

SUBJECT, 11 a.m.: "Domestic Smoke Abatement."

Chairman—SIR GEORGE LIVESEY, KT., M.I.M.E.

THURSDAY, DECEMBER 14TH.

SUBJECT, 11 a.m.: "Factory and Trade Smoke Abatement."

Chairman—SIR WILLIAM H. PREECE, K.C.B., M.INST.C.E., F.R.S.

FRIDAY, DECEMBER 15TH.

SUBJECT, 11 a.m.: "Administration, Legislation, and Necessary Reforms."

Chairman—SIR WILLIAM RICHMOND, K.C.B., R.A.

An Exhibition of Smoke Appliances will be held in connection with the Conference.

Classification of Exhibits.

SOLID FUEL.
- Various forms.
- Heating Appliances.
- Cooking Appliances.
- Trade and Municipal Appliances.

OIL FUELS.
- Various Preparations and Mixtures.
- Heating Appliances.
- Cooking Appliances.
- Trade and Municipal Appliances.

HOT WATER AND STEAM.
- Boilers.
- Radiators and Appliances for Heating Buildings.

GAS.
- Installations for Domestic Manufacture.
- Heating Appliances.
- Cooking Appliances.
- Trade and Municipal Appliances.

ELECTRICITY.
- Apparatus for Small Installations.
- Heating Appliances.
- Cooking Appliances.
- Trade and Municipal Appliances.

TESTING APPLIANCES.
- Thermometers.
- Pyrometers.
- Meters.
- Gauges.
- Tintometers.

DOMESTIC DESTRUCTORS AND REFUSE CONSUMERS.

MODELS, PHOTOGRAPHS, & DRAWINGS.

Sessional Meetings.

The following arrangements have been made:—

York, October 7th. "Some Aspects of the Pure Milk Problem from Within," by C. W. Sorensen (of the White Rose Dairy Farm, formerly Chief Dairy Expert to the New Zealand Government). Visits to White Rose Model Dairy Farm, New Earswick Model Cottages, and Huxley Road Cocoa Works. Members will be entertained at Tea by the Lord Mayor.

Northampton, Saturday, November 4th. "The Boot and Shoe Trade as it affects the Health of the Workers in it," by C. F. Wright, Chief Factory Inspector, Nottingham.

Special Course on Food and Meat Inspection.

Third Special Course of Practical Training in Food and Meat Inspection for Commissioned Officers and Professional Students preparing for the Examination for Inspectors of Meat and Other Foods, conducted by The Royal Sanitary Institute, will commence on November 22nd, 1905.

Courses of Instruction for Sanitary Officers, in Sanitary Science, and for Meat Inspectors.

The Fortieth Course of Lectures and Demonstrations to Sanitary Officers commenced on Tuesday, September 19th; the Lectures on Sanitary Science as applied to Buildings and Public Works on September 23rd; and the Eighth Course of Practical Training for Meat Inspectors on September 29th.

Examinations.

In Sanitary Science as applied to Buildings and Public Works and for Inspectors of Nuisances under the Public Health Act, 1875.

Liverpool	.. ..	October 13th and 14th.
Leicester	.. ..	October 20th and 21st.

PROSPECTIVE ARRANGEMENTS.

Congress, 1906.

An invitation from an influential Local Committee, presided over by Dr. Colston Wintle, Chairman of the Health Committee of the City of Bristol, to hold the next Congress and Exhibition of the Institute in that City in 1906, has been accepted by the Council, and it has been arranged that the Congress shall meet in July, from the 9th to the 14th.

1907.

The Second International Congress on School Hygiene will be held in London from August 5th to 10th, and an Exhibition will be organised by the Institute in connection with the meeting.

Congress, 1908.

An invitation has been received, and has been accepted by the Council, from the Corporation of Cardiff to hold the Congress of the Institute in 1908 in that City.

3 F. Lecture to School Teachers at Bedford College, at 4.45 p.m., by **Miss Mortimer.**

3 F. Lecture to Sanitary Officers at 7 p.m. Ventilation, Warming, and Lighting, by A Saxon Snell, F.R.I.B.A.

3 F. Demonstration on Home Drainage in the Parkes Museum, at 6 p.m.

4 S. **Sessional Meeting,** at 11 am., NORTHAMPTON. Discussion on "The Boot and Shoe Trade as it affects the Health of the Workers in it," by C. F. Wright, Chief Factory Inspector, Northampton.

4 S. Demonstration—Meat Inspectors Course.

4 S. Inspection and Demonstration at Marylebone Workhouse, and Public Baths, at 3 p.m. Conducted by A. Saxon Snell, F.R.I.B.A.

6 M. Lecture to Sanitary Officers at 7 p.m. House Drainage, by W. C. Tyndale, M.INST.C.E.

6 M. Demonstration on Water Supply in the Parkes Museum, at 6 p.m.

8 W. Lecture to Sanitary Officers at 7 p.m. Water Supply: Sources of Supply and Distribution, by J. E. Worth, M.INST.C.E.

8 W. Inspection and Demonstration in the District of St. Pancras, at 3 p.m. (number limited). Conducted by W. G. Auger, Sanitary Inspector.

10 F. Lecture to Sanitary Officers at 7 p.m Water: Composition, Pollution, and Purification, by A. Wellesley Harris, M.R.C.S., D.P.H.

10 F. Demonstration—Meat Inspectors Course.

10 F.
11 S. } Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Newcastle.

13 M. Lecture to Sanitary Officers at 7 p.m. Sewerage, by J. E. Worth, M.INST.C.E.

15 W. Lecture to Sanitary Officers at 7 p.m. Sewage Disposal, by " "

15 W. Inspection and Demonstration at L.C.C. Municipal Lodging House, Mill Lane, Deptford, S.E., at 3 p.m.

16 Th. Inspection and Demonstration at the Metropolitan Cattle Market, York Road, N., at 2 p.m. Conducted by James King, M.R.C.V.S., Veterinary Inspector, Metropolitan Cattle Market.

17 F. Lecture to Sanitary Officers at 7 p.m. Scavenging, Disposal of House Refuse, by J. E. Worth, M.INST.C.E.

18 S. Demonstration—Meat Inspectors Course.

20 M. Lecture to Sanitary Officers at 7 p.m. Signs of Health and Disease in Animals destined for food, when alive and after slaughter. Tuberculin and other Tests, by W. Bunting, F.R.C.V.S.

21 T. Demonstration—Meat Inspectors Course.

22 W. Lecture to Sanitary Officers at 7 p.m. The Names and Situations of the Organs of the Body in Animals, by W. Hunting, F.R.C.V.S.

22 W. Lecture to Commissioned Officers and Professional Men, at 5.30 p.m., on Meat Inspection, by James King, M.R.C.V.S.

22 W. Inspection and Demonstration at a Factory Building, 77, St. John Street, Clerkenwell, at 3 p.m. Conducted by H. D Searles Wood, F.R.I.B.A.

23 Th. Lecture to Sanitary Officers at 7 p.m. Diseased Meat, with a Demonstration of Morbid Specimens collected from Meat Markets, by James King, M.R.C.V.S.

24 F. Lecture to Sanitary Officers at 7 p.m. Practical Methods of Stalling and Slaughtering Animals, by W. Hunting, M.R.C.V.S.

24 F. Lecture to Commissioned Officers and Professional Men, at 5.30 p.m., on Meat Inspection, by James King M.R.C.V.S.

25 S. **Sessional Meeting,** at 11 a.m., HASTINGS.

27 M. Lecture to Sanitary Officers at 7 p.m. The Appearance and Character of Fresh Meat, Organs, Fat, Blood, Fish, Poultry, Milk, Fruit, Vegetables, and other food, and the conditions rendering them, or preparations of them, fit or unfit for human consumption. Preserving and Storing Meat and other foods, by E. Petronell Manby, B.A., M.D., D.P.H.

27 M. Lecture to Commissioned Officers and Professional Men, at 5.30 p.m., on Meat Inspection, by James King, M.R.C.V.S.

28 T. Demonstration of Meat Inspection to Commissioned Officers and Professional Men at Metropolitan Cattle Market, at 3 p.m., by James King, M.R.C.V.S.

29 W. Lecture to Commissioned Officers and Professional Men, at 5.30 p.m., on Meat Inspection, by James King, M R.C.V.S.

29 W. Lecture to Sanitary Officers at 7 p.m. The Hygiene of Byres, Lairs, Cowsheds and Slaughterhouses, and all places where animals destined for the supply of food are kept, and the Hygiene of Markets Dairies, and other places where food is stored, prepared, or exposed for sale, and transported, by E. Petronell Manby, B.A., M.D., D.P.H.

29 W. Inspection and Demonstration at Harrison & Barber's Knacker's Yard, Winthrop Street, Whitechapel, E., at 3 p.m. Conducted by R. Glover, F.R.C.V.S.

30 Th. Lecture to Sanitary Officers at 7 p.m. The Laws, By-Laws, and Regulations affecting the Inspection and Sale of Meat and other articles of food, including their preparation and adulteration, by E. Petronell Manby, B.A., M.D., D.P.H.

30 Th. Lecture to Commissioned Officers and Professional Men, at 5 p.m., on Tinned and Potted Food, by Prof. H. R. Kenwood, M.B., D.P.H.

CONTRIBUTIONS AND ADDITIONS TO LIBRARY.

⁂ *For publications of Societies and Institutions, etc., see under "Academies."*

ACADEMIES (British).

London. *The Institution of Civil Engineers.* Minutes and Proceedings, 1904–5, Vol. CLX., Pt. II, 480 pp. (plates), 8vo. London, 1905. *The Institution.*

Birmingham, *C. L., M.D., D.P.H.* Handbook of Irish Sanitary Law: together with abstracts of various statutes, orders, and regulations affecting the administration of workhouse infirmaries and poor-law dispensary districts. 189 pp., 8vo. Dublin, 1905. *The Author.*

Bombay. *Improvement Trust.* Administration Report for the year ending 31st March, 1905. 14 pp., fcp. Bombay, 1905. *The Trust.*

Cairo. *Ministry of Public Instruction.* Records of the Egyptian Government School of Medicine. Vol. III. Edited by the Director. 158 pp., 4to. Cairo, 1905. *The Director.*

Davies, *Lt.-Col. A. M., M.R.C.S., D.P.H.* A Handbook of Hygiene. Third Edition. 658 pp., 8vo. London, 1905. *The Publishers (Chas. Griffin & Co., Ltd.)*

Durham. *The University College of Medicine.* Calendar for the year 1905–6. 163 pp., 8vo. Newcastle-upon-Tyne, 1905. *The College.*

Geological Survey. Summary of Progress of the Geological Survey of the United Kingdom and Museum of Practical Geology for 1904. 184 pp., 8vo. London, 1905. *His Majesty's Government.*

Greenwood, *A., M.D., D.P.H.* Report on an Inquiry into the extent of underfeeding amongst the school-children of Blackburn. 76 pp., 8vo. Blackburn, 1905. *The Author.*

Local Government Board. Thirty-third Annual Report, 1903–4; Supplement containing the Report of the Medical Officer for 1903–4. 622 pp., 8vo, London, 1905,

——— Dr. Reginald Farrar's report on cases of cerebro-spinal meningitis occurring in Irthlingborough (Northamptonshire). No. 218. 12 pp., fcap. London, 1905. *W. H. Power, C.B., F.R.S.*

London. *Guy's Hospital Medical School.* Calendar for the year 1905-6. 104 pp., 8vo. London, 1905. *The Dean of the School.*

Metropolitan Asylums Board. Annual Report for the year 1904. 340 pp., 8vo. London, 1905. *The Board.*

Nicholson, W. Smoke Abatement: a manual for the use of manufacturers, inspectors, medical officers of health, engineers, and others. 256 pp., 8vo. London, 1905. *The Publishers (Chas. Griffin & Co., Ltd.)*

Punjab. Report of the Sanitary Administration and Proceedings of the Sanitary Board for the year 1904, by Lieut.-Col. C. J. Bamber, I.M.S., D.P.H.; and Report on Sanitary Works for 1904, by C. E. V. Goument, A.M.I.C.E. 17 pp., fcap. Lahore, 1905. *Lieut.-Col. C. J. Bamber, I.M.S., D.P.H.*

Robinson, *Prof. H., M.Inst.C.E.* Sewerage and Sewage Disposal. Second Edition. 208 pp., 8vo. London, 1905. *The Author.*

Royal Commission on Sewage Disposal. Special and General Evidence, by Geo. Reid, M.D., D.P.H., given on December 9th, 1904, and May 17th, 1905. 38 pp., 8vo. 1905. *The Author.*

Tasmania. Report of the Royal Commission on the General Hospitals, Hobart and Launceston, and Hospital for the Insane, New Norfolk. 41 pp., fcap. Tasmania, 1905. *J. S. E. Elkington, M.D., D.P.H.*

West Ham. *Municipal Technical Institute.* Programme of Day and Evening Classes for the Eighth Session, 1905-6. 204 pp., 8vo. London, 1905. *The Institute.*

PARKES MUSEUM NEW PREMISES FUND.

	£	s.	d.
AMOUNT ALLOTTED BY COUNCIL	9,000	0	0
CONTRIBUTIONS AND DONATIONS PROMISED 1899–1904	1,101	13	0
CONTRIBUTIONS, 1905, ALREADY REPORTED, INCLUDING GUARANTEE FUND	1,428	9	0

Contributions since last report.

		£	s.	d.
T. G. U. CONCANNON ...	during five years	5	5	0
R. A. EVERS ...		0	10	6
MISS R. MCMILLAN ...		1	0	0
R. W. NEWMAN ...		1	1	0
MAGNUS OHREN ...		2	2	0
K. B. SHROFF ...		0	10	0

September 23rd, 1905.

THE ROYAL SANITARY INSTITUTE.

REVIEWS OF BOOKS.

HANDBOOK OF SANITATION.*

The author, in his preface, contrasts the redundant literature of all branches of elementary hygiene existent in England with the meagre library of this character to be found in the United States. He then proceeds to explain that his work has for its aim and scope the instruction of students in the theory and practice of modern-day municipal sanitation.

The opening chapter, on soil and sites, is fairly clear and full, but there are several omissions and errors. In discussing damp courses for walls, no mention is made of glazed stoneware and blue brick in their construction. Again, in dealing with air, CO_2 is stated to be "a virulent poison in large amounts," whereas CO is only incidentally mentioned, with other products of combustion, as harmful when habitually inhaled.

The author appears to be a little mixed in his conception of the commonly accepted distinction between natural and artificial ventilation. He tells us, for example, that "windows, doors, fireplaces, chimneys, shafts, courts, etc., are all artificial methods of securing ventilation, although we usually regard them as means of natural ventilation." He also appears to attach undue importance to the amount of perflation which takes place through bricks and masonry. We are told, correctly enough, that in ordinary rooms a greater height than 14 feet is of very little advantage, but the fact is not explained.

There is a notable omission from the paragraph on domestic filters, no mention being made of the use of unglazed porcelain (Pasteur-Chamberland's) or other like material (Berkefeld's) in their construction.

In treating of deep wells, the author makes the following most extraordinary statement: "Deep wells, or artesian wells as they are also called, are wells the depth of which is over 50 ft. from the surface."

The amount of refuse to be disposed of in large cities is stated to be "quite considerable," and then the actual weight collected annually in one city is given, without mention of the number of the population producing it.

Looseness and ambiguity of expression occur in every chapter. We catch the meaning of the following sentence, but do not like its construction: "Drinking-water is the ever present agent in the spread of many diseases." Again, we have tautology like the following: "Nitrogenous matter, mineral salts, organic matter."

In the chapter on the disposal of sewage we are told that "as a rule, one acre of land is sufficient to dispose of the sewage of 100 to 150 people." It is hardly necessary to mention that, even without precipitation of sewage or deep drainage of land, an acre of ordinary ground will commonly serve for more than double this amount.

The pail system of excrement disposal is spoken of with approval, notwithstanding the general condemnation of this system by military and civil authorities in America and Europe.

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*Handbook of Sanitation: A Manual of Theoretical and Practical Sanitation. By George M. Price, M.D., Medical Sanitary Inspector, Department of Health, New York City. Jno. Wiley and Sons. New York. 1905.

The author very wisely advocates the use of cast-iron drain pipes for the drainage of houses, and especially for those built upon made ground; and it is matter for regret that the practice of New York in this respect is not more generally followed in other civilized cities and countries.

The section on sewers and drains on the whole is carefully written, but it is far from being complete, and much of the advice it contains is out of date. The old stereotyped rule for falls in pipes of various diameters is given without explanation, and wash-down and wash-out closet-basins are recommended with joints uniting them to the soil-pipe beneath the floor on which they stand.

In discussing the water test for house drains, it is stated that the test is applicable "to the vertical and horizontal pipes in new plumbing," without the mention of any limit in the head of water to be used—an obviously unsafe direction.

The tenement-house problem, with special reference to its aspect in New York and other American cities, is discussed at some length, and the author is here evidently dealing with a matter of which he has had no small experience. It is interesting to note that our American cousins agree with us in thinking "that lazy, indolent, dirty, ignorant, and malicious tenants are often as much responsible for the insanitary conditions existing in tenements as indifferent, grasping owners or lessees"; and also that the difficulty of securing the decent use and maintenance of the w.c.'s attached to poor house property is as great with them as with us.

Cellars of private houses in America would appear to be more liable to give rise to nuisance than with us, and this owing to the fact that they are commonly storerooms for refuse, and often contain as well the furnace of a heating apparatus.

Factories and workshops are not distinguished from each other, in New York and most other American States, as they are in this country. A factory in New York is apparently any "manufacturing or business establishment where one or more persons are employed at labour." The minimum cubic space per head is greater as a rule in the American States than in this country. 400 cubic feet is the amount for ordinary working times as compared with our 250 cubic feet. The author states, truly enough, that this is insufficient, and that there should be at least 1,000 cubic feet for each individual; but is this intended as a counsel of perfection only, or as a reasonable objective? We all know that with ordinary ventilation (three changes in an hour) 1,000 cubic feet per head is required for the maintenance of a healthy atmosphere, but we also know that such an amount of space would be absolutely prohibitive to many trades now profitably carried on.

Nine-tenths of the city bakeries in the States are said to be "situated in cellars of tenements or old houses." If this be a fact, the American bakehouses are much behind our own in all that makes for sanitary fitness.

Offensive trades and the causes of their offensiveness are described at some length, as also the usual means of abating the nuisances arising from them. It is interesting to note that, for administrative purposes in the States, no distinction is drawn between common nuisances (like the noises from heavy traffic and machinery in motion, from street cries and street music) and those of an offensive character. The former are all dealt with by the author under the heading of offensive trades. In dealing with nuisances occasioned in gas works, no mention is made of the unpleasant odours produced in the manufacture of ammonium sulphate, which frequently give rise to much popular complaint.

The author is apparently labouring under a misconception with regard to the

usual methods of slaughtering animals such as oxen, sheep, and pigs, for he says that there are two ways of killing them, viz., by stunning and by cutting the throat, and that the former has the disadvantage of leaving the blood in the tissues. The fact is, of course, that all bovine animals (upon which stunning is almost always practised, except by the Jews) are effectually bled after the preliminary blow on the head with pole-axe or hammer. The Admiralty report upon the slaughtering of animals in this country is one of the most illuminating contributions to the subject which have recently appeared, and might be studied by the author of this book with advantage.

The chapters on milk and other dairy products, and upon food preservation, are sound, but necessarily, from the scope of the book, not exhaustive. There is but scant allusion to the fraudulent incorporation of water with butter, which has given rise to so much stir in this country of late. From this it is to be inferred that the practice of blending water and butter-milk with butter has not yet been seriously taken up in the States.

The powers possessed by municipal authorities in America for exercising sanitary supervision over "all places where food is manufactured, prepared, handled, stored, exposed for sale, and distributed" are certainly ample; but here, as elsewhere, everything depends upon whether the executive body have the capacity, energy, and honesty to carry them out.

A food inspector in New York, when entering a milk store to take samples, must first "announce his authority," and then proceed to make preliminary lactometric and thermometric examination of the milk. This appears to be a less satisfactory arrangement than that which obtains in this country, where the sample (taken, if necessary, in the first instance by an unofficial deputy) is immediately divided by the inspector into three portions, each of which is carefully sealed and labelled, one being handed to the vendor, one retained by the officer, and one taken to the analyst for exact analysis.

The chapter on disinfectants and disinfection contains much useful information, but one is not altogether disposed to agree with the author in thinking that "sulphur dioxide is (ordinarily) very dangerous and injurious to those handling it," and that bichloride of mercury in solution is a suitable disinfectant for application to metallic furniture. It is noticeable, also, that no mention is made of the action of mercuric chloride upon iron or other metallic vessels.

In one of the concluding chapters, entitled "Sanitation as a Profession," we are told, on the authority of Dr. Chas. V. Chaplin, that "unfortunately most appointees to official sanitary positions in the United States are entirely untrained for the duties they are to perform. To exhibit some degree of natural ability is all that is asked, and often this is not required, the sole qualification of the appointee being his political service to the party which has the appointing power." Notwithstanding this startling statement, however, and the further assertion that sanitary inspectors in the States have but few educational facilities, it would seem from the samples of civil service examination papers for inspector-candidates which are given, that the standard of knowledge, both theoretical and practical, required on the part of such officers in America, does not differ materially from that which obtains in this country.

As already stated, this book contains much useful information, but, although it has already reached a second edition, it is certainly in need of considerable revision and amplification before it can be accepted as a reliable guide for the officers and other persons it is specially intended to instruct in the performance of their duties. P. B.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
Hygiene of Special Classes, Trades, and Professions; and Municipal Administration.
Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

The articles referred to in this list are as far as possible collected and filed in the Library of the Institute for the use of the Members and Associates.

Science in relation to Hygiene and Preventive Medicine.

"ENGINEERING RECORD." Experiments with Typhoid germs at the Columbus Testing Station. 23rd Sept., 1905, p. 344.

Summary of investigations made at the Sewage Testing Station at Columbus, U.S.A., to determine the vitality of typhoid germs in sewage effluent.

Building Materials, Construction, and Machinery.

"ENGINEERING RECORD." Concrete Houses. 7th Oct., 1905, p. 392.

Notes on the use and misuse of hollow concrete building blocks.

——— Working Men's Houses. 7th Oct., 1905, p. 391.

Editorial Review of the Reports of "The Department of Commerce and Labour," U.S.A., concerning the homes of working people in Great Britain and Europe.

Water Supply, Sewerage, and Refuse Disposal.

BRUNTON, JAMES F. Notes on the Working of the Shone System of Sewage at Karachi. *Proc. Inst. Civil Eng.*, Vol. CLX., 1905, pp. 211–238.

Describes installation briefly, and trials made to find out reason of unsatisfactory working, which was found to result from great loss of power. The Appendix of details takes up the greater part of the paper. Discussion and correspondence (with those on another paper), pp. 246–270.

FOX-STRANGWAYS, C. Memoirs of the Geological Survey, England and Wales. The Geology of the Country between Derby, Burton-on-Trent, Ashby-de-la-Zouch, and Loughborough. London, 1905.

Water-supply is alluded to on p. 4, and sections of a number of borings (some of which were made for water) are given in an Appendix.

JAKES-BROWNE, A. J. Memoirs of the Geological Survey, England and Wales. The Geology of the Country South and East of Devizes. 8vo. London, 1905.

Chap. XI., pp. 52–7, deals with springs and water-supply. The geologic formations noticed are Lower and Upper Greensand and Chalk, and then some wells and borings are described, the deepest being 320 feet.

STEVENSON, EDMUND A., and BURSTAL, EDWARD K. The Sewerage of Douglas, Isle of Man. *Proc. Inst. Civil Eng.*, Vol. CLX., 1905, pp. 239–245.

Short history of subject. Separate systems for low and high levels found to be essential. Tabular statement of sewage-lifts. Discussion and correspondence (with those on another paper), pp. 246–270.

MEETINGS HELD.

SESSIONAL MEETINGS.

York.—The Meeting was held in the Council Chamber, Guildhall, on Saturday, October 7th, 1905, when a discussion on "Pure Milk Supply" was opened by Mr. C. W. Sorensen (of the White Rose Dairy Farm) on "Some Aspects of the Pure Milk Problem from Within." The chair was taken by W. Whitaker, B.A., F.R.S. Visits were made to the White Rose Model Dairy Farm, New Earswick Model Cottages, and Haxby Road Cocoa Works. Members were welcomed by the Rt. Hon. the Lord Mayor and later entertained at Tea by the Lady Mayoress in the Mansion House.

EXAMINATIONS.

Sanitary Science as applied to Buildings and Public Works.

October 13 and 14.	Liverpool.	4 Candidates;	1 Certificate granted.
October 20 and 21.	Leicester.	1 Candidate;	no Certificate granted.

Inspectors of Nuisances.

October 13 and 14.	Liverpool.	41 Candidates;	13 Certificates granted.
October 20 and 21.	Leicester.	34 Candidates;	17 Certificates granted.

Hygiene in its Bearing on School Life.

October 20 and 21.	Leicester.	*4 Candidates;	2 Certificates granted.

CANDIDATES WHO HAVE RECEIVED CERTIFICATES.

In Sanitary Science as applied to Buildings and Public Works.

ADCOCK, KEITH WHITE.

Inspectors of Nuisances.

ARNOLD, ERNEST RICHARD.
ASHMAN, RICHARD WILLIAM.
BIRD, JAMES GILBERT HAROLD.
CLARKE, WILLIAM.
CLIBBENS, ELIZABETH MARY.
COLEMAN, HORACE.
DILLINGHAM, STUART STANLEY.
EDWARDS, LEONARD.
EDWARDS, RICHARD.
EVANS, EDWIN.

* Two of these entered for Part I. only, and one satisfied the Examiners.

SUPPLEMENT.

Fox, Henry.
Harp, Moreton.
Hall, Alice Eaborn.
Hargraves, James Richard.
Knight, Horace Julian.
Lewis, Charles.
Lloyd, Margaret Annie.
Meakins, Arthur John.
Millar, David.
Pratt, Jesse William.
Rees, Edmund.
Statham, John Archibald.
Stazicker, Henry.
Strother, Robert William.
Thorley, Francis, Richard.
Vaughan, Thomas.
Walker, William.
Williams, Brainerd Stroud.
Williams, Pierce.
Woodham, Henry.

Hygiene in its Bearing on School Life.

Halsey, Evangeline.
Moss, Alice Emily.

FORTHCOMING MEETINGS.

A Conference on Smoke Abatement and Exhibition of Smoke Abatement Appliances

Has been arranged by the Institute, in conjunction with the Coal Smoke Abatement Society, to be held in London, at the Horticultural Hall, Westminster, on December 12th to 15th, 1905.

The Meetings of the Conference will be arranged as follows:—

Tuesday Evening, December 12th.

Presidential Address by SIR OLIVER LODGE, F.R.S., D.Sc., LL.D.

Wednesday, December 13th.

Subject, 11 a.m.: "Domestic Smoke Abatement."

Chairman—Sir George Livesey, M.Inst.C.E., M.I.M.E.

Thursday, December 14th.

Subject, 11 a.m.: "Factory and Trade Smoke Abatement."

Chairman—Sir William H. Preece, K.C.B., M.Inst.C.E., F.R.S.

Visit to Gas Works.

Friday, December 15th.

Subject, 11 a.m.: "Administration, Legislation, and Necessary Reforms."

Chairman—Sir William B. Richmond, K.C.B., R.A.

Visit to Abbey Mills Pumping Station, L.C.C.

An Exhibition of Smoke Appliances will be held in connection with the Conference.

Classification of Exhibits.

Solid Fuel.
- Various forms.
- Heating Appliances.
- Cooking Appliances.
- Trade and Municipal Appliances.

Oil Fuels.
- Various Preparations and Mixtures.
- Heating Appliances.
- Cooking Appliances.
- Trade and Municipal Appliances.
- Lighting.

Hot Water and Steam.

Boilers.
Radiators and Appliances for Heating Buildings.

Gas.

Installations for Domestic Manufacture.
Heating Appliances.
Cooking Appliances.
Trade and Municipal Appliances.
Lighting.

Electricity.

Apparatus for Small Installations.
Heating Appliances.
Cooking Appliances.
Trade and Municipal Appliances.
Lighting.

Testing Appliances.

Thermometers.
Pyrometers.
Meters.
Gauges.
Tintometers.

Domestic Destructors and Refuse Consumers.

Models, Photographs, & Drawings.

Sessional Meetings.

The following arrangements have been made:—

Northampton, Saturday, November 4th, at 11 a.m. "The Boot and Shoe Trade as it affects the Health of the Workers," and "The Mortality Statistics of Boot and Shoe Workers in Northampton," by C. F. Wright (Chief Factory Inspector, Northampton), and James Beatty, M.D., D.P.H. Visits to a Boot and Shoe Factory, the Refuse Destructor, and the Electric Generating Station.

London, Tuesday, November 14th, at 8 p.m., in the Parkes Museum. "Rural Housing; the Construction of Healthy and Cheap Cottages; the Exhibition at Letchworth," by J. F. J. Sykes, M.D., D.Sc., and T. W. Aldwinckle, F.R.I.B.A.

Hastings, Saturday, November 25th, at 11 a.m. "Water Filtration." The discussion will open with The Health Aspect, by A. Scarlyn Wilson, D.P.H., M.O.H.; Pressure Filters, by Philip H. Palmer, M.Inst.C.E.; and The Chemical Aspect, by H. F. Cheshire, B.Sc., F.C.S. Visit to the Corporation Waterworks at Brede, where the New Pressure Filters will be inspected.

Special Course on Food and Meat Inspection.

Third Special Course of Practical Training in Food and Meat Inspection for Commissioned Officers and Professional Students preparing for the Examination for Inspectors of Meat and Other Foods, conducted by The Royal Sanitary Institute, will commence on November 22nd, 1905.

Examinations.

In Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances under the Public Health Act, 1875:—Newcastle, November 10th and 11th.

Calendar, November and December, 1905.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesday in each Month at 5 p.m.

Exhibition Committee . . Congress and Editing Committee	Monday in the week preceding the Council, at 4.30 p.m. & 5.30 p.m.
Examination Committee . . Museum and Library Committee	Tuesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Special Purposes Committee . Finance Committee . . .	Wednesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Parliamentary Committee . New Premises Committee . Disinfectant Standardisation Committee	As occasion requires.

The Parkes Museum is open free, on Mondays 9.30 a.m. to 8 p.m., other days 9.30 a.m. to 5.30 p.m. The Library and Office are closed at 1 p.m. on Saturdays.

Council and Committee Meetings are suspended during August and September, and the Museum and Library are closed on Public Holidays.

NOVEMBER.

1 W. Lecture to Sanitary Officers at 7 p.m. Details of Plumbers' Work, by J. Wright Clarke.

1 W. Inspection and Demonstration in the District of Islington, at 2 p.m. (number limited). Conducted by James R. Leggatt, Supt., Public Health Dept., Borough of Islington.

3 F. Lecture to School Teachers at Bedford College, at 4.45 p.m., by Miss Mortimer.

3 F. Lecture to Sanitary Officers at 7 p.m. Ventilation, Warming, and Lighting, by A. Saxon Snell, F.R.I.B.A.

3 F. Demonstration on Home Drainage in the Parkes Museum, at 6 p.m.

4 S. **Sessional Meeting**, at 11 a.m., Northampton. Discussion on "The Boot and Shoe Trade as it affects the Health of the Workers, and the Mortality Statistics of Boot and Shoe Workers in Northampton," by C. F. Wright, Chief Factory Inspector, Northampton, and J. Beatty, M.D., D.P.H., M.O.H.

4 S. Demonstration—Meat Inspectors Course.

4 S. Inspection and Demonstration at Marylebone Workhouse, and Public Baths, at 3 p.m. Conducted by A. Saxon Snell, F.R.I.B.A.

6 M. Lecture to Sanitary Officers at 7 p.m. House Drainage, by W. C. Tyndale, M.INST.C.E.

6 M. Demonstration on Water Supply in the Parkes Museum, at 6 p.m.

8 W. Lecture to Sanitary Officers at 7 p.m. Water Supply: Sources of Supply and Distribution, by J. E. Worth, M.INST.C.E.

8 W. Inspection and Demonstration in the District of St. Pancras, at 3 p.m. (number limited). Conducted by W. G. Auger, Sanitary Inspector.

10 F. Lecture to Sanitary Officers at 7 p.m. Water: Composition, Pollution, and Purification, by A. Wellesley Harris, M.R.C.S., D.P.H.

10 F. Demonstration—Meat Inspectors Course.

10 F.
11 S. } Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Newcastle.

13 M. Lecture to Sanitary Officers at 7 p.m. Sewerage, by J. E. Worth, M.INST.C.E.

4 T. **Sessional Meeting,** at 8 p.m., in THE PARKES MUSEUM. "Rural Housing—The Construction of Healthy and Cheap Cottages—The Exhibition at Letchworth," by J. F. J. Sykes, M.D., D.SC., and T. W. Aldwinckle, F.R.I.B.A.

5 W. Lecture to Sanitary Officers at 7 p.m. Sewage Disposal, by J. E. Worth, M.INST.C.E.

5 W. Inspection and Demonstration at L.C.C. Municipal Lodging House, Mill Lane, Deptford, S.E., at 3 p.m.

3 Th. Inspection and Demonstration at the Metropolitan Cattle Market, York Road, N., at 2 p.m. Conducted by James King, M.R.C.V.S., Veterinary Inspector, Metropolitan Cattle Market.

7 F. Lecture to Sanitary Officers at 7 p.m. Scavenging, Disposal of House Refuse, by J. E. Worth, M.INST.C.E.

3 S. Demonstration—Meat Inspectors Course.

) M. Lecture to Sanitary Officers at 7 p.m. Signs of Health and Disease in Animals destined for food, when alive and after slaughter. Tuberculin and other Tests, by W. Hunting, F.R.C.V.S.

l T. Demonstration—Meat Inspectors Course.

2 W. Lecture to Sanitary Officers at 7 p.m. The Names and Situations of the Organs of the Body in Animals, by W. Hunting, F.R.C.V.S.

2 W. Lecture to Commissioned Officers and Professional Men, at 5.30 p.m., on Meat Inspection, by James King, M.R.C.V.S.

2 W. Inspection and Demonstration at a Factory Building, 77, St. John Street, Clerkenwell, at 3 p.m. Conducted by H. D. Searles Wood, F.R.I.B.A.

3 Th. Lecture to Sanitary Officers at 7 p.m. Diseased Meat, with a Demonstration of Morbid Specimens collected from Meat Markets, by James King, M.R.C.V.S.

4 F. Lecture to Sanitary Officers at 7 p.m. Practical Methods of Stalling and Slaughtering Animals, by W. Hunting, M.R.C.V.S.

4 F. Lecture to Commissioned Officers and Professional Men, at 5.30 p.m., on Meat Inspection, by James King, M.R.C.V.S.

5 S. **Sessional Meeting,** at 11 a.m., HASTINGS. Discussion on "Water Filtration." Health Aspect, by A. Scarlyn Wilson, D.P.H., M.O.H. Pressure Filters, by P. H. Palmer, M.INST.C.E. Chemical Aspect, by H. F. Cheshire, B.SC., F.C.S.

7 M. Lecture to Sanitary Officers at 7 p.m. The Appearance and Character of Fresh Meat, Organs, Fat, Blood, Fish, Poultry, Milk, Fruit, Vegetables, and other food, and the conditions rendering them, or preparations of them, fit or unfit for human consumption. Preserving and Storing Meat and other foods, by E. Petronell Manby, B.A., M.D., D.P.H.

7 M. Lecture to Commissioned Officers and Professional Men, at 5.30 p.m., on Meat Inspection, by James King, M.R.C.V.S.

3 T. Demonstration of Meat Inspection to Commissioned Officers and Professional Men at Metropolitan Cattle Market, at 3 p.m., by James King, M.R.C.V.S.

9 W. Lecture to Commissioned Officers and Professional Men, at 5.30 p.m., on Meat Inspection, by James King, M R.C.V.S.

9 W. Lecture to Sanitary Officers at 7 p.m. The Hygiene of Byres, Lairs, Cowsheds, and Slaughterhouses, and all places where animals destined for the supply of food are kept, and the Hygiene of Markets, Dairies, and other places where food is stored, prepared, or exposed for sale, and transported, by E. Petronell Manby, B.A., M.D., D.P.H.

9 W. Inspection and Demonstration at Harrison & Barber's Knacker's Yard, Winthrop Street, Whitechapel, E., at 3 p.m. Conducted by R. Glover, F.R.C.V.S.

) Th. Lecture to Sanitary Officers at 7 p.m. The Laws, By-Laws, and Regulations affecting the Inspection and Sale of Meat and other articles of food, including their preparation and adulteration, by E. Petronell Manby, B.A., M.D., D.P.H.

) Th. Lecture to Commissioned Officers and Professional Men, at 5 p.m., on Tinned and Potted Food, by Prof. H. R. Kenwood, M.B., D.P.H.

DECEMBER.

1 F. Lecture to Commissioned Officers and Professional Men, at 5 p.m. By Prof. H. R. Kenwood, M.B.

1 F. } Examination in Sanitary Science as applied to Buildings and Public Works, and
2 S. } for Inspectors of Nuisances, Manchester.

2 S. Demonstration—Meat Inspectors Course, at 2 p.m.

2 S. Demonstration on Meat Inspection to Commissioned Officers and Professional Men at Metropolitan Cattle Market, at 3 p.m., by James King, M.R.C.V.S.

4 M. Lecture to Commissioned Officers and Professional Men, at 5 p.m. Fish, Eggs, Tea, Coffee, Cocoa, Chocolate, and Lime-juice, by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

5 T. Lecture to Commissioned Officers and Professional Men, at 5 p.m. Wheat, Rice, Arrowroot, and other Grains, Potatoes, Flour, Bread, Biscuits, Sugars, by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

6 W. Lecture to Commissioned Officers and Professional Men, at 5 p.m. Succulent Vegetables and Fruits, Jams; the Condiments—Vinegar, Pepper, Mustard; Prepared, Concentrated, and Preserved Foods, by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

7 Th. Lecture to Commissioned Officers and Professional Men, at 5 p.m. Alcoholic Beverages—Beer, Wines, Whisky, Brandy, etc., by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

8 F. Visit to Factory for preparation of Concentrated and Preserved Foods.

8 F. } Examination in Sanitary Science as applied to Buildings and Public Works, and
9 S. } for Inspectors of Nuisances, London.

12 T. } **Conference on Smoke Abatement.** Royal Horticultural Society's Hall,
15 F. } 11 a.m. to 1 p.m. Visits 2.15 p.m. Exhibition open from 10 a.m. to 6 p.m.

15 F. } Examination for Inspectors of Meat and other Foods, London.
16 S. }

FELLOWS, MEMBERS, AND ASSOCIATES ELECTED.

Reg. No.	Date of Election.	FELLOWS.
470	1905. Oct.	CAMPBELL, Kenneth Findaleter, M.INST.C.E., M.I.E.E., F.R.P.S.E., *Duneira, Huddersfield.*
861	1905. Oct.	JONES, Herbert, L.R.C.S.I., L.M., L.A.H., L.S.A., D.P.H.CAMB., *Bankside, Hereford.*
1076	1905. Oct.	KING, James, M.R.C.V.S., *Park Nook, Clay Hill, Enfield.*
1106	1905. Oct.	MATTHEWS, Ernest Romney, F.G.S., F.R.G.S., F.R.S.E., *Borough Engineer, Bridlington.*
1173	1905. Oct.	SNELL, Ernest Hugh, M.D., B.SC.LOND., M.R.C.S., L.R.C.P., D.P.H.CAMB., 10*a*, *Hay Lane, Coventry.*
1789	1905. Oct.	THOMPSON, J. Ashburton, M.D., D.P.H., L.R.C.P. M.R.C.S., 93, *Macquarie Street, Sydney, N.S.W.*

MEMBERS.

*** Marked thus have passed the Examination of the Institute in Sanitary Science as applied to Buildings and Public Works.**

S **Marked thus have passed the Examination of the Institute in Hygiene in its bearing on School Life.**

‡ Marked thus have passed the Examination of the Institute for Inspectors of Nuisances.

1981 1905. Oct. ABERN, Richard, M.B., B.S., D.P.H.CAMB., *Tooting Infirmary, London, S. W.*

1991 1905. Oct. *ASHE, Miss Katherine Elizabeth, 51, *Princes Buildings, Perth, Western Australia.*

1992 1905. Oct. *S*BARRACLOUGH, Fred, 14, *Dorset Road, Harehills Lane, Leeds.*

1993 1905. Oct. *S*BUTLER, Thomas Edwin, 14, *Roundhay Place, Leeds.*

1994 1905. Oct. *CAFFREY, John, *Technical School, Armagh.*

1982 1905. Oct. CRAWFORD, Major G. S., R.A.M.C., L.R.C.S., L.R.C.P., D.P.H., 21, *Grosvenor Road, Aldershot, Hants.*

1983 1905. Oct. CREE, Lieut.-Col. Gerald, R.A.M.C., *c/o Messrs. Holt & Co.*, 3, *Whitehall Place, S.W.*

1984 1905. Oct. ‡DAVIES, Samuel, 22, *Brompton Avenue, Egremont, Cheshire.*

1985 1905. Oct. HART, George Adam, *Municipal Buildings, Leeds.*

1986 1905. Oct. HITCHINS, Alfred Eden, *The Water and Sewerage Department, Port of Spain, Trinidad.*

1995 1905. Oct. *HOUSTON, William, 44, *Victoria Street, South Circular Road, Dublin.*

1987 1905. Oct. JACKSON, Major Robert William Henry, R.A.M.C., B.A., M.B., D.P.H., *Royal Army Medical Corps, Cork, Ireland.*

1996 1905. Oct. *S*KIRK, Mrs. Florence, 61, *Tennyson Place, Bradford.*

1997 1905. Oct. *LAMBLE, Philip Thomas, *The Sanitary Board, Hong Kong.*

1988 1905. Oct. MCWEENEY, Edmond J., M.A., M.D., D.P.H., 84, *St. Stephen's Green, Dublin.*

1989 1905. Oct. ‡PENGELLY, John Isaac, 15, *St. James Road, Exeter.*

1998 1905. Oct. *S*RALPHS, Edwin, *Queen's College, Hong Kong.*

1999 1905. Oct. *RUSSELL, Charles Tudor, *Cotham Lodge*, 143, *Green Lanes, Clissold Park, N.*

2000 1905. Oct. *S*TAYLOR, Miss Alice, "*Olinda,*" *Alma Road, Winton, Bournemouth.*

1990 1905. Oct. TONGE, Jeffrey A., 125, *Nottingham Road, Mansfield, Nottingham.*

2001 1905. Oct. *WHITE, James William, *R. E. Offices, Hong Kong.*

2002 1905. Oct. *WILLIAMS, Daniel Thomas, 9, *The Parade, Cardiff.*

2003 1905. Oct. *WRIGHT, John Joseph, *Essex St., Gordon, Sydney, N.S.W.*

ASSOCIATES.

* Marked thus have passed the Examination of the Institute in Sanitary Science as applied to Buildings and Public Works.

M Marked thus have passed the Examination of the Institute for Inspectors of Meat and Other Foods.

‡ Marked thus have passed the Examination of the Institute for Inspectors of Nuisances.

3622 1905. Oct. **M*‡AINLEY, Edwin, *Public Health Offices*, 2, *Paradise Row, Bethnal Green, N.E.*

3623 1905. Oct. ‡ALDERSLEY, James Edward, 4, *Brook Street, Skipton, Yorks.*

3624 1905. Oct. ‡BEATTIE, Richard, *P.O. Box* 59, *Randfontein, Transvaal.*

3625 1905. Oct. ‡BICKNELL, William Bidgood, *Long Street, Williton, near Taunton.*

3626 1905. Oct. ‡BLAKER, James, *P.O. Box* 1049, *Turffontein, Johannesburg.*

3627 1905. Oct. ‡BOOKER, Thomas Edmund, 71, *Wickham Street, Beeston Hill, Leeds.*

3628 1905. Oct. ‡BOWKER, Walter Stanley, *Sunnyside, Russell Street, Eccles.*

3629 1905. Oct. CAZALET, Miss Charlotte Travers, *Neva, Cuthbert Road, Westgate-on-Sea.*

3630 1905. Oct. ‡CHANT, Frederick Charles, 25, *St. Paul's Road, Salisbury.*

3631 1905. Oct. ‡CLAY, Charles Joseph, 33, *Moor Street, Johannesburg, S. Africa.*

3632 1905. Oct. ‡CLIFFORD, Frank, 10, *Thomas Street, St. Pauls, Bristol.*

3633 1905. Oct. ‡DONNELLY, Samuel Holt, 28, *Wilson Street, Stretford.*

3634 1905. Oct. ‡EDWARDS, John, *Rural District Council Offices, Dolgelly.*

3635 1905. Oct. ‡EVANS, John, *Victoria House, Erwood, R.S.O., Brecon.*

3636 1905. Oct. ‡GALLACHER, Cornwall Marquis, 1417, *Argyle Street, Overnewton, Glasgow.*

3637 1905. Oct. ‡GELLY, David, 2, *Elm Place, Loughor, Glam.*

3638 1905. Oct. ‡GETHING, Charles Edward, *Wordsley, near Stourbridge, Staffs.*

3639 1905. Oct. ‡GIBBON, Edward Frederick, 11, *High Street, Haverfordwest, Pembroke.*

3640 1905. Oct. ‡GIBBON, Frederick, 11, *High Street, Haverfordwest, Pembroke.*

3641 1905. Oct. ‡GRAY, John, 40, *Falkner Street, Gloucester.*

3642 1905. Oct. ‡GREEN, Miss Georgina Maud, 20, *Mapperley Road, Nottingham.*

3643 1905. Oct. ‡GREG, Miss S. Eleanor, *Lode Hill, Handforth, Cheshire.*

3644 1905. Oct. ‡HOWELL, Frederick Percy, 40, *Queen Street, Irlams-o'-the-Height, Manchester.*

3645 1905. Oct. ‡HUNKIN, Harry, *Caerhysddu, Neath, Glam.*

3646 1905. Oct. ‡Lewis, Owen Meredith, 3, *Penrhys Road*, *Tylorstown*, *Glam.*

3647 1905. Oct. ‡Lloyd, William, 40, *Hibbert Rd.*, *Lea Bridge Road*, *Leyton*, *Essex.*

3648 1905. Oct. ‡Lottering, Theunir Christian, *Assistant Sanitary Inspector*, *Pretoria*, *Transvaal.*

3649 1905. Oct. ‡Montague, Mrs. Eunice Mary, 35, *Potter Street*, *Worksop*, *Notts.*

3650 1905. Oct. ‡Mugford, John Sidney, *Hirwain*, *Glam.*

3651 1905. Oct. ‡Nicholas, William, 20, *Woodland Road*, *Newport*, *Mon.*

3652 1905. Oct. ‡Parker, F. A., 24, *Dockray Street*, *Colne*, *Lancs.*

3653 1905. Oct. ‡Parsons, Reginald Ridgman, *Marina*, *The Den*, *Teignmouth.*

3654 1905. Oct. ‡Pearce, William George, 18, *Edith Avenue*, *Plymouth.*

3655 1905. Oct. ‡Penny, Arthur George, *Box* 6551, *Johannesburg*, *S. Africa.*

3656 1905. Oct. ‡Penrose, James William Henry, 18, *King Street*, *Plymouth.*

3657 1905. Oct. ‡Powers, Percy, *Leicester Road*, *Hinckley*, *Leicestershire.*

3658 1905. Oct. ‡Ramsden, Miss Sarah Alice, 58, *Brookshaw Street*, *Bury.*

3659 1905. Oct. ‡Sackett, Allen A., 86, *Queen Street*, *Ramsgate.*

3660 1905. Oct. ‡Saunders, Ernest Victor, SERG.-MAJ. R.A.M.C., *Sherbrooke*, *Durrington*, *Wilts.*

3661 1905. Oct. ‡Smale, William Lewis Branscombe, *Cedars Road*, *St. Leonards*, *Exeter*, *Devon.*

3662 1905. Oct. ‡Small, Stuart Sidney, *Council Offices*, *Broadstairs.*

3663 1905. Oct. ‡Steven, Miss Dora, 25, *St. Andrew Street*, *Norwich.*

3664 1905. Oct. ‡Stewart, Alexander Brechin, 82, *Bruntsfield Place*, *Edinburgh.*

3665 1905. Oct. ‡Stone, Albert Brentnall, *Sanitary Inspector*, *Johannesburg*, *S. Africa.*

3666 1905. Oct. ‡Sweeney, Patrick, *Cloverley House*, *Wood Lane*, *Timperley*, *Cheshire.*

3667 1905. Oct. ‡Thornton, Stead, 27, *Castle Street*, *Bolton.*

3668 1905. Oct. ‡Watson, William Cruickshank, *Inspector*, *Johannesburg*, *S. Africa.*

3669 1905. Oct. ‡Winter, Frank Ernest, 112, *Gloucester Road*, *Bishopston*, *Bristol.*

3670 1905. Oct. ‡Wrighton, Frank Abner, *Food Inspector*, *Johannesburg*, *S. Africa.*

3671 1905. Oct. ‡Young, Henry, *Victoria Avenue*, *Saffron Walden*, *Essex.*

CONTRIBUTIONS AND ADDITIONS TO LIBRARY

*** *For publications of Societies and Institutions, etc., see under "Academies."*

ACADEMIES (British).

London. *The Junior Institution of Engineers.* Record of Transactions. Part I, Vol. XV. Address by the President, W. H. Lindley, M.Inst.C.E., F.G.S., on "Municipal Engineering on the Continent." 45 pp., 8vo. London, 1905.

——— *The Institution of Mechanical Engineers.* Proceedings, January–February, 1905. 164 pp., 8vo. London, 1905. *The Institution.*

Adams, *H., M.Inst.C.E., F.S.I.* Practical Trigonometry for the use of Engineers, Architects, and Surveyors. 69 pp., 8vo. London, 1905. *The Author.*

Bashore, *Harvey B.* The Sanitation of a Country House. 103 pp., 8vo. New York, 1905. *J. Wiley & Sons (Publishers).*

Board of Education. Reports on Children under Five Years of age in Public Elementary Schools, by Women Inspectors of the Board. 155 pp., 8vo. London, 1905. *The Board.*

Booth, *W. H.* Steam Pipes: their Design and Construction. A Treatise on the Principles of Steam Conveyance and means and materials employed in practice, to secure Economy, Efficiency, and Safety. 187 pp., 8vo. London, 1905. *A. Constable & Co., Ltd. (Publishers).*

Casson, *W. A., Barrister-at-Law.* Knight's Annotated Model By-laws, comprising the Model Series of the Local Government Board under the Public Health Acts. Seventh Edition. 349 pp., 8vo. London, 1905. *C. Knight & Co. (Publishers).*

Cornes, *J.* Modern Housing in Town and Country. Illustrated by examples of Muncipal and other schemes of Block Dwellings, Tenement Houses, Model Cottages and Villages. Also plans and descriptions of the Cheap Cottages Exhibition. 196 pp., 4to. London, 1905. *B. T. Batsford (Publisher).*

Fish, *J. C. L., Assoc.M.Am.Soc.C.E.* Typhoid Fever Epidemic at Palo Alto, California. A Report made to the Palo Alto Board of Health. 62 pp., 8vo. Palo Alto, 1905. *The Board.*

Geological Survey. England and Wales. The Water-supply of Berkshire from underground sources, by the late J. H. Blake, F.G.S., Assoc.M.Inst.C.E., with contributions by William Whitaker, B.A., F.R.S. 115 pp., 8vo. London, 1905. *His Majesty's Government.*

Local Government Board. The Public Health Act, 1875. Report on Water-supply of that portion of the East Riding of Yorkshire which is known as Holderness. 30 pp., fcp. London, 1905.

——— Dr. H. Timbrell Bulstrode's Report upon the Sanitary state and administration of the Isle of Wight Rural District. No. 219. 21 pp., 8vo. London, 1905. *W. H. Power, C.B., F.R.S.*

London County Council. Handbook giving particulars of the Council's Scholarships, and other Scholarships open to London children, together with the list of London Secondary Schools. (Session 1905–6.) 83 pp., 8vo. London, 1905. *The Council.*

London. The Royal College of Surgeons of England. Calendar. August, 1905–July, 1906. 346 pp., 8vo. London, 1905. *The College.*

Manchester. Third Annual Report of the Education Committee, 1904–1905. 167 pp., 8vo. Manchester, 1905. *The Committee.*

MEDICAL OFFICERS OF HEALTH AND OTHER SANITARY REPORTS.

Aberdeen, 1904	.. *Matthew Hay, M.D.*
Aberdeen, August, 1905 ..	.. *Matthew Hay, M.D., C.M.*
Battersea, 1904 (San. Insp.)	.. *I. Young (Chief San. Insp.)*
Bradford, 1904	.. *W. Arnold Evans, M.D., B.Sc.*
Bridlington, 1904	.. *W. A. Wetwan, M.R.C.S.*
Glamorgan C.C., 1904 ..	.. *W. Williams, M.A., M.D., D.P.H.*
Glasgow, 1904	.. *A. K. Chalmers, M.D., D.P.H.*
Gloucestershire C.C., 1904 ..	.. *J. Middleton Martin, M.D., D.P.H.*
Hackney, 1904	.. *J. King Warry, M.D., M.R.C.P.*
Handsworth, 1904	.. *J. Richmond, M.D., D.P.H.*
Huddersfield, 1904	.. *S. G. Moore, M.D., D.P.H.*
Huddersfield, 2nd quarter, 1905	.. *S. G. Moore, M.D., D.P.H.*
Manchester, 1904 (Rivers Dept.)	.. *Chairman of Rivers Committee.*
Nottingham, 1904	.. *P. Boobbyer, M.D., M.O.H.*
Oldham, 1904	.. *J. B. Wilkinson, M.D., D.P.H.*
Salford, 1904	.. *C. H. Tattersall, L.R.C.P., M.R.C.S.*
West Riding C.C., 1904 ..	.. *J. R. Kaye, M.B., D.P.H.*
Wiltshire C.C., 1904 ..	.. *J. Tubb-Thomas, M.O.H.*
York, 1904	.. *E. M. Smith, M.D., D.P.H.*

Metropolitan Asylums Board. Report *re* Return Cases of Scarlet Fever and Diphtheria between July, 1901, and July, 1902; together with the Observations of the Medical Superintendents of the Board's Fever Hospitals thereon. By A. G. R. Cameron, M.B., D.P.H. 224 pp., fcp. London, 1905. *The Board.*

New Jersey. Twenty-eighth Annual Report of the State Board of Health and of the Bureau of Vital Statistics, 1904. 483 pp., 8vo. New Jersey, 1905. *The Board.*

Ottawa. *Laboratory of the Inland Revenue Department.* Bulletins Nos. 103 (Peppers) and 104 (Jams, Marmalades, and Jellies). 28 pp., 8vo. Ottawa, 1905. *A. McGill (Acting Chief Analyst).*

Punjab. Report on Vaccination for the Year 1904–5. By Lieut.-Col. C. J. Bamber, I.M.S., D.P.H. 21 pp., fcp. Lahore, 1905. *The Author.*

Registrar-General. Census of England and Wales, 1901. General Report, with Appendices. 325 pp., fcap. London, 1904. *The Registrar-General.*

Smyth, *A. Watt.* A Text-book of the Principles of Hygiene based on Physiology, for the use of School Teachers. 256 pp., 8vo. London, 1905. *The Author.*

Sydney. Metropolitan Combined Sanitary Districts, Annual Report of the Medical Officer of Health for the Year 1904. 25 pp., fcp. Sydney, 1905. *W. G. Armstrong, M.B., D.P.H.*

EXHIBITS RECENTLY ADDED TO THE MUSEUM.

Glass. Two shaped square "Cloisonné" glass fixed in frames with lettering, "Parkes Museum," at Entrance Corridor, Museum.
The Cloisonné Glass Co., 9, *Berners Street, W.*

Stable or Yard Fitting. Salt-glazed fireclay niche, circular headed and beaded for fixing on wall opposite draw-off taps, and having grating, traps, and supply pipes complete. *Leeds Fireclay Co.*, 2, *Norfolk Street, Strand.*

Water Closets. Range of two isolated siphonic closets, fitted with automatic flushing cistern, connecting pipes, and trap.
Leeds Fireclay Co., 2, *Norfolk Street, Strand.*

Well. One length, 24 in. diameter, 3 ft. long, well lining tube, the "Well-Sinker's Friend," salt-glazed fireclay, rebatted joint.
Leeds Fireclay Co., 2, *Norfolk Street, Strand.*

PARKES MUSEUM NEW PREMISES FUND.

	£	s.	d.
AMOUNT ALLOTTED BY COUNCIL	9,000	0	0
CONTRIBUTIONS AND DONATIONS PROMISED 1899–1904	1,101	13	0
CONTRIBUTIONS, 1905, ALREADY REPORTED, INCLUDING GUARANTEE FUND	1,438	17	6

Contributions since last report.

		£	s.	d.
THOMAS BUTLER			10	6
WILLIAM C. CHATFIELD	during five years	21	0	0
MISS L. CLIFFE	during five years	1	5	0
THE WORSHIPFUL COMPANY OF CORDWAINERS		10	10	0
G. W. COYSH	during five years	2	12	6
GEORGE A. HART		1	1	0
T. J. MOSS-FLOWER	during five years	21	0	0
WILLIAM TAYLOR	during five years	2	12	6
W. T. TOOGOOD			10	6
Other Amounts			5	0

October 24th, 1905.

THE ROYAL SANITARY INSTITUTE.

REVIEWS OF BOOKS.

CLIMATE AND HEALTH IN HOT COUNTRIES.*

The author of this work is to be congratulated on the way he has dealt with this important and complex subject. In simple language he has brought within the grasp of the non-professional man and woman the means by which they may best secure the maximum of health within the tropics, and emerge from an active life of residence there, free from the penalties which in former years a long stay in hot climates and an unsuitable mode of life was most likely to entail. Although the author's experience deals almost entirely with India, nevertheless the principles he puts forward are no less applicable to other tropical and sub-tropical countries.

The work is divided into two parts—the first part of which is devoted to personal tropical hygiene, while the second deals mainly with climate.

We particularly commend the chapter on Housing and Domestic Architecture, and although it is not always possible for the individual to be in a position fortunate enough to select the site for his dwelling, or to erect his own house, still many existing buildings may be improved upon and converted into healthy dwellings at little cost, if the simple advice given in the text is acted on, as far as structural arrangements permit.

The chapter on Water and Food is excellent, and there is no subject of more importance in tropical life. If any criticism can be made it is, perhaps, that the subject of parasitic diseases connected with food supplies has not received the attention that it demands; a proper supply of healthy animals for food is of extreme importance. It may also be noted that "boiling" and "sterilising" milk are not synonymous terms. It is quite impossible to sterilise milk unless it is raised to a temperature far above the boiling-point, whereas milk can be "pasteurized" at a far lower temperature, and if this is done in a water-bath or *bain-marie* to not more than 75° C., little of its nutritive properties will be lost.

Much useful information is given in the chapters on the Tropical Day and on the Management of Children. These chapters are written in homely and simple language, and are well worth careful study by the parents of children resident in tropical countries.

The chapters on Prevention of Malaria, &c., are a résumé of our present knowledge on these subjects, and the chief preventive measures to be taken are given in detail.

The second part of this book deals with tropical climatology and is especially valuable from the large number of *Tables* of temperature, rainfall, &c., given. It should prove an exceedingly useful guide for those seeking information on the

* Climate and Health in Hot Countries, and the Outlines of Practical Climatology, by Lieut.-Col. G. M. Giles, M.B., F.R.C.S. 293 pages. Price 7s. 6d. John Bale, Son, and Danielsson. London, 1904.

subject, and has its interest, too, for those who study disease in relation to climate and soil.

We commend this work to those who propose to reside in tropical or subtropical countries; in it they will find much useful information as to the means most likely to preserve their health while there. If the advice given is acted on it should do much to diminish the risk to health, which long residence in the tropics predisposes to. J. L. N.

SCHOOL ATTENDANCE OF CHILDREN UNDER FIVE YEARS OF AGE.*

This report embodies the results of an inquiry undertaken by five women inspectors of the Board of Education, by desire of the latter, and lasting for about twelve months, from April, 1904, onwards. The same form of inquiry was issued to all the inspectors, and the following were some of the more important of the special headings under which information was to be gathered:—

1. Number of infants. 2. Qualifications of teachers. 3. Length of school hours. 4. Length of intervals. 5. Length of lessons. 6. Extent of interference with free movements of children arising from school discipline. 7. Particulars of school curriculum. 8. Particulars of sanitation and amenities of school premises. 9. Particulars of the amount of attention, if any, paid to physical exercises and other details of school hygiene. 10. Classification of children (a) by age, (b) by attainments. 11. Particulars of apparent influence of early school instruction upon subsequent intelligence and capacity of children. 12. Parental reasons for sending infants to school.

The answers to queries under each heading were in every case to be supplemented by remarks on the part of the investigators.

Some thousands of children were examined, and many different tests were employed by the several inspectors, but, as a result, all the latter were agreed that the intelligence of children between three and five years of age is not materially assisted by school instruction during this period.

One of the reports, to the purport of which editorial exception is frequently taken in footnotes, contains allegations of gross mismanagement in many of the schools visited. In one school, we are told, the baby class did not go into the playground at all—"It took too long to get babies in and out of the room."

But, apart from gross defects of this character (which, after all, are mere matters of detail), the system of uniform drill for body and mind, without granting the smallest independence or making the slightest allowance for physical and mental variations in individual infants, was found not only practically useless, but, as already stated above, actually harmful. Undigested information is imparted, and an almost mechanical automatism secured, with the simultaneous loss of much energy, alertness, power of initiative, observation, and imagination.

The best results were found in some country schools, where the cut-and-dried infant curricula of London and other large towns were mostly conspicuous by their absence.

Infant schools we are told—and we know—must continue to exist in many poor districts. In bad slum-districts the children are usually better off in almost

* Reports on Children under Five Years of Age in Public Elementary Schools, by Women Inspectors of the Board of Education. 155 pp., 8vo. Wyman and Sons. London, 1905.

any schools than in the foul dens which constitute their only homes, or in the courts, alleys, and yards which are the only other alternative to the latter.

The physique of the infant children attending schools in slum neighbourhoods is (very credibly) stated to be better than that of those remaining at home. Where mothers go to work, moreover, the children are said with perfect truth to be safer at the schools than elsewhere.

The report suggests that what is required on the part of the teachers or matrons in such schools is rather a sympathetic motherly spirit than that of doctrinaire instructors. With this opinion we heartily concur, as also with the view that what is required by most of the infants finding their way to such schools is "no formal instruction, but more play, more sleep, more free conversation, story-telling, and observation," than are at present obtainable.

The Board of Education has certainly struck the right note in issuing this report, and is to be congratulated upon its enlightened action in giving local education authorities a free hand in the matter of the provision of school accommodation for children under five years of age. P. B.

PRACTICAL DOMESTIC HYGIENE.*

This is the fourth edition of the small work which forms one of the well-known Practical Elementary Science Series. It does not, therefore, call for a lengthy review, and the names of the authors are a sufficient guarantee of scientific accuracy and good judgment in the treatment of the subject matter.

The work is primarily intended for those who are desirous of acquiring a knowledge of elementary hygiene; and, recognising the necessary correlation of hygiene and physiology, the writers have devoted the opening chapters of the work to a consideration of the elements of human physiology. Certain chapters of the book are very properly devoted to the purely domestic aspect of preventive medicine, and others deal with the care and management of the sick, and the rendering of first aid in accidents and emergencies. It may be suggested to the authors that in preparing the next edition it would be well to eliminate one or two non-essential matters from the book, which in all other respects leaves nothing to be desired. For instance, the description and illustration on page 73, of the rain-water separator, are insufficient, and probably, in such a work, unnecessary; the atomic weight, density, and freezing point of argon, page 97; and the average composition of midden-town sewage and water-closet sewage, given in the table on page 201. The drawing (figure 52) of a "washdown" closet is capable of improvement; and a little explanation might be given of the statement (page 222), which must necessarily puzzle a beginner in the study of hygiene, that "owing to the severity of this water-test it is undesirable that it be recklessly applied to old pipes and drains." The work is well printed and illustrated, and a useful summary of the contents is set out at the end of each chapter. H. R. K.

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* Practical Domestic Hygiene, by J. Lane Notter, M.A., M.D., and R. A. Firth, F.R.C.S., D.P.H. New Edition. 320 pp. Longmans, Green, and Co. Price 1s. 10½d.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
Hygiene of Special Classes, Trades, and Professions; and Municipal Administration.
Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

The articles referred to in this list are as far as possible collected and filed in the Library of the Institute for the use of the Members and Associates.

Science in relation to Hygiene and Preventive Medicine.

HAYNES, ROBERT H. Cremation. *Surveyor*, July 7th, 1905, p. 27.

Prejudice against cremation—the Cremation Acts—description of crematorium furnaces.

Building Materials, Construction, and Machinery.

"ENGINEERING RECORD." Regulations for Hollow Concrete Blocks. Oct. 14th, 1905, p. 443.

Regulations in force regarding the use of hollow concrete blocks for building in Philadelphia.

SAVAGE, EDWARD B., Assoc.M.Inst.C.E. Experiences in Drain and Sewer Construction. *Surveyor*, May 19th, 1905, p. 593; May 26th, 1905, p. 621; and June 2nd, 1905, p. 640.

Classification of various characters of sewage—liquid trade refuse—slaughter-house refuse—electro-plate works—breweries—gasworks—steam users—domestic sewage. Separation of surface water, advantages and disadvantages—sewer and drain construction—pipe sewers—testing sewers and drains. Disconnecting traps—sewer and drain ventilation.

Water Supply, Sewerage, and Refuse Disposal.

COTTERELL, A. P. I., M.Inst.C.E. The Management of Works of Sewage Disposal. *Building News*, Aug. 19th, 1905, p. 212.

Different modes of dealing with sewage—land treatment the ideal—quantity to be treated studied to detriment of quality—trained specialists as managers.

LASSEN, —. Water Softening and Purifying. *Surveyor*, May 17th, 1905, p 367.

Standards of hardness—purification of condensed water—apparatus for softening and its working.

LATHAM, BALDWIN, M.Inst.C.E. Notes on Sewage Disposal. *Surveyor*, April 21st, 1905, p. 496; April 28th, 1905, p. 523; and May 5th, 1905, p. 536.

Public Health Acts—chemical and other processes of disposal—iron processes —magnesia and phosphate processes—electricity. Land purification—intermittent filtration—bacterial filters—analyses of effluents and table of results. Contact beds and filters—Friern Barnet sewage—the septic process—sanitation and health—sanitation and economics.

MOORE, GEORGE T. Copper as an Algicide and Disinfectant in Water Supplies. *Surveyor*, June 9th, 1905, p. 675.

Value of copper proved—prejudice against copper—effect on fish—neutralization of the copper sulphate—effect on algæ and other organisms—cost of copper sulphate treatment.

SMITH, J. F. OSBORNE, F.R.I.B.A. Country Houses and Accessory Buildings. *Building News*, March 3rd, 1905, p. 303.

Water supply—cisterns, etc.—baths—water closets—soil and waste pipes—urinals, sinks, gullies—rain-water storage—land drains—stables—disposal of sewage.

Heating, Lighting, and Ventilation.

BARRETT, Professor W. F., F.R.S. Heating of Buildings and Dust Deposition. *Building News*, June 23rd, 1905, p. 886.

The educational and scientific aspects of the question—experiments in a small room—electric heating—steam and hot-water heating—dust and dirt.

CAMERON, SIR CHARLES. Impure Air Aboveground and Underground. *Building News*, May 5th, 1905, p. 637.

The importance of fresh air—Manchester statistics—sanitary house foundations—sewer ventilation.

MEETINGS HELD.

SESSIONAL MEETINGS.

Northampton.—The Meeting was held in the Council Chamber, Guildhall, on Saturday, November 4th, 1905, when a discussion on "The Boot and Shoe Trade as it affects the Health of the Workers," and "The Mortality Statistics of Boot and Shoe Workers in Northampton," was opened by C. F. Wright (Chief Factory Inspector, Northampton) and James Beatty, M.D., D.P.H. The chair was taken by Col. J. Lane Notter, M.A., M.D., R.A.M.C. Visits were made to Messrs. C. and E. Lewis's Boot and Shoe Factory, the Refuse Destructor, and the Electric Generating Station. The Members were welcomed by the Worshipful the Mayor (Counc. A. E. Marlow).

London.—The Meeting was held in the Parkes Museum on Tuesday, November 14th, 1905, when a discussion on "Rural Housing; the Construction of Healthy and Cheap Cottages; the Exhibition at Letchworth,"

was opened by J. F. J. Sykes, D.Sc., M.D., and T. W. Aldwinckle, F.R.I.B.A.

Hastings.—The Meeting was held in the Council Chamber, Town Hall, on Saturday, November 25th, 1905, when a discussion on Water Filtration was opened by A. Scarlyn Wilson, D.P.H., M.O.H., on the "Health Aspect," Philip H. Palmer, M.Inst.C.E., on "Pressure Filters," and H. F. Cheshire, B.Sc., F.I.C., on "The Chemical Aspect." The chair was taken by Col. J. Lane Notter, M.A., M.D., R.A.M.C. A visit was made to the Corporation Waterworks at Brede, when the Pressure Filters were inspected.

Examinations.

Inspectors of Meat and Other Foods.

October 27 and 28. Cardiff. 3 Candidates; 2 Certificates granted.

Inspectors of Nuisances.

November 10 and 11. Newcastle. 36 Candidates; 24 Certificates granted.

Candidates who have received Certificates.

Inspectors of Meat and Other Foods.

Butler, Richard Heber. Goodman, William Henry.

Inspectors of Nuisances.

Bell, William.
Calvert, Robert.
Cooper, Edmund.
Copping, John Richard.
Dorin, Anthony.
Dunn, John James.
Durkin, John Thomas.
Foster, Thomas.
Innes, George Robert.
Jackson, John Horsley.
Knewstubb, Alfred.
Lake, Charles Arthur.
Lamond, John.
Lea, Robert.
McKendry, James.
Ogston, Alexander.
Pickering, Harold.
Price, Richard Edward.
Tait, Leonard.
Tesseyman, John Robert.
Turnbull, Matthew.
Wadge, Tom Stenlake.
Wills, Thomas Richard.
Wilson, George Edward.

FORTHCOMING MEETINGS.

A Conference on Smoke Abatement and an Exhibition of Smoke Abatement Appliances

will be held from Dec. 12th to the 15th, 1905. A Programme of the arrangements is given at page 136.

Sessional Meetings, 1906.

The following dates and places are proposed for 1906:—

Manchester, Feb. 2nd and 3rd. Discussion on "Meat Inspection," and on "Jointing of Pipes for Drains and Sewers."

London, Feb. 14th. Discussion on "Is the Intercepting Trap a Failure?"

Leicester, Derby, Glasgow, Oxford, Bournemouth, Belfast, Leeds.

Examinations.

In Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances under the Public Health Act, 1875:—

Manchester, December 1st and 2nd.
London, December 8th and 9th.

Inspectors of Meat and other Foods:—

London, December 15th and 16th.

Calendar, December, 1905.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesday in each Month at 5 p.m.

Exhibition Committee . . Congress and Editing Committee	Monday in the week preceding the Council, at 4.30 p.m. & 5.30 p.m.
Examination Committee . . Museum and Library Committee	Tuesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Special Purposes Committee . Finance Committee . . .	Wednesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Parliamentary Committee . New Premises Committee . Disinfectant Standardisation Committee	As occasion requires.

The Parkes Museum is open free, on Mondays 9.30 a.m. to 8 p.m., other days 9.30 a.m. to 5.30 p.m. The Library and Office are closed at 1 p.m. on Saturdays.

Council and Committee Meetings are suspended during August and September, and the Museum and Library are closed on Public Holidays.

DECEMBER.

1 F. Lecture to Commissioned Officers and Professional Men, at 5 p.m. Milk, Butter, and Cheese. By Prof. H. R. Kenwood, M.B.

1 F. } 2 S. } Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, Manchester.

2 S. Demonstration—Meat Inspectors Course, at 2 p.m.

2 S. Demonstration on Meat Inspection to Commissioned Officers and Professional Men at Metropolitan Cattle Market, at 3 p.m., by James King, M.R.C.V.S.

4 M. Lecture to Commissioned Officers and Professional Men, at 5 p.m. Fish, Eggs, Tea, Coffee, Cocoa, Chocolate, and Lime-juice, by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

5 T. Lecture to Commissioned Officers and Professional Men, at 5 p.m. Wheat, Rice, Arrowroot, and other Grains, Potatoes, Flour, Bread, Biscuits, Sugars, by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

6 W. Lecture to Commissioned Officers and Professional Men, at 5 p.m. Succulent Vegetables and Fruits, Jams; the Condiments—Vinegar, Pepper, Mustard; Prepared, Concentrated, and Preserved Foods, by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

7 Th. Lecture to Commissioned Officers and Professional Men, at 5 p.m. Alcoholic Beverages—Beer, Wines, Whisky, Brandy, etc., by Col. J. Lane Notter, M.A., M.D., D.P.H., R.A.M.C.

8 F. Visit to Factory for preparation of Concentrated and Preserved Foods.

8 F. }
9 S. } Examination in Sanitary Science as applied to Buildings and Public Works, and for Inspectors of Nuisances, London.

9 S. Demonstration—Meat Inspectors Course, 2 p.m.

12 T.
13 W.
14 Th.
15 F. } **Conference on Smoke Abatement and Exhibition.** Royal Horticultural Society's Hall, 11 a.m. to 1 p.m. Visits 2.15 p.m. Exhibition open from 10 a.m. to 8 p.m.

15 F. }
16 S. } Examination for Inspectors of Meat and other Foods, London.

FELLOW, MEMBERS, AND ASSOCIATES ELECTED.

FELLOW.

Reg. No.	Date of Election.	
1583	1905. Nov.	HORROCKS, Major William H., B.A.M.C., M.D., B.SC.LOND., D.P.H., *Gibraltar.*

MEMBERS.

* Passed Examination in Sanitary Science as applied to Buildings and Public Works.

‡ Marked thus have passed the Examination of the Institute for Inspectors of Nuisances.

2004	1905. Nov.	COORLAWALA, Rustorn Nusserwangi, L.R.C.P., L.R.C.S.(EDIN.), D.P.H., *c/o Thomas Cook & Son, Ludgate Circus, E.C.*
2005	1905. Nov.	CORBIN, Herbert Ernest, M.R.C.S., L.R.C.P., B.SC., D.P.H., *Isolation Hospital, Willesden, N.W.*
2006	1905. Nov.	HANCOCK, George Charles, M.R.C.S., L.R.C.P., D.P.H., *Elmhurst, Pelham Road, Gravesend.*
2007	1905 Nov.	HEATH, H. Llewellyn, L.S.A., D.P.H., *High Street, Ipswich.*
2008	1905. Nov.	‡SALKIELD, Tom, *City Engineer, Delhi, India.*
2009	1905. Nov.	WILLOUGHBY, Willoughby Mason, B.A., M.D., B.C., D.P.H., 2, *Cumberland Villas, Gravesend.*
2010	1905. Nov.	WILSON, James Mitchell, M.D., D.P.H., F.C.S., *County Hall, Beverley, York.*
2011	1905. Nov.	*ADCOCK, Keith White, *The Manse, Low Moor, Bradford.*
2012	1905. Nov.	*DUNNING, William John, *Assistant Surveyor, Colwyn Bay, Denbigh.*

ASSOCIATES.

‡ Marked thus have passed the Examination of the Institute for Inspectors of Nuisances.

3672	1905. Nov.	‡BARNES, Thomas John, *Ellesmere, Ingatestone Road, Woodford.*
3673	1905. Nov.	‡COLEMAN, Horace, 20, *Tregothnan Road, Clapham Rise, S.W.*
3674	1905. Nov.	‡CUNLIFFE, Edward Royston, 7, *Charlotte Street, Rochdale.*
3675	1505. Nov.	‡DEMPSEY, John, 15, *Alexandra St., Lower Broughton, Salford.*

3676 1905. Nov. ‡DOUGLAS, Thomas, 9, *Mindrum Terrace, Percy Main, Northumberland.*

3677 1905. Nov. ‡EVANS, Edwin, 2, *Ivy Road, Cricklewood, N.W.*

3678 1905. Nov. ‡FOWLER, William, 2, *Coldcall Street, Woodhouse Street, Leeds.*

3679 1905. Nov. ‡HARGRAVES, James Richard, 9, *Cornfield Street, Milnrow, near Rochdale.*

3680 1905. Nov. ‡LEWIS, Charles, 78, *Alton Street, Crewe.*

3681 1905. Nov. ‡LLOYD, Miss Margaret Annie, 74, *Fentham Road, Gravelly Hill, Birmingham.*

3682 1905. Nov. ‡REES, Edmund, *The Darran, Cowbridge, S. Wales.*

3683 1905. Nov. ‡SENDELL, Frank Guy, 1, *Carlton Rd., Walthamstow.*

3684 1905. Nov. ‡SHAWCROSS, James Thomas, 5, *Grove St., Didsbury, Manchester.*

3685 1905. Nov. ‡THORLEY, Francis Richard, Junr., "*Hewcroft,*" 205, *Pershore Road, Selly Park, near Birmingham.*

3686 1905. Nov. ‡WILLIAMS, Pierce, 141, *Upper Warwick Street, Liverpool.*

3687 1905. Nov. ‡WOODHAM, Henry, *Chandler's Ford, Southampton.*

CONTRIBUTIONS AND ADDITIONS TO LIBRARY.

*** *For Publications of Societies and Institutions, etc., see under "Academies."*

ACADEMIES (BRITISH).

London. *The Institution of Civil Engineers.* Minutes of Proceedings with selected and other abstracted papers. Vol. CLXI. 415 pp., 8vo. London, 1905. *The Institution.*

Buchanan, *Major A., M.A., M.D.* Malarial Fevers and Malarial Parasites in India. Second Edition. 216 pp., 8vo. Calcutta, 1903. *Thacker, Spink, & Co.*

Johannesburg. Rand Plague Committee. Report upon the Outbreak of Plague on the Witwatersrand, March 18th to July 31st, 1904. 103 pp., fcp. Johannesburg, 1905. *W. C. C. Pakes, D.P.H., F.C.S.*

India. Thirty-seventh Annual Report of the Sanitary Commissioners for Bengal, 1904. 78 pp., fcp. Calcutta, 1905. *Capt. W. Wesley Clemesha, M.D., D.P.H., I.M.S.*

New Zealand. Public Health Statement by the Minister of Public Health, The Hon. Sir J. G. Ward, K.C.M.G. 77 pp., fcp. Wellington, 1905. *The Minister of Public Health.*

Queensland. Report on an Epidemic of Dengue Fever in Brisbane, by the Commissioner of Public Health. 8 pp., fcp. Brisbane, 1905. *B. Burnett Ham, M.D., D.P.H.*

Toronto. Annual Report of the City Engineer for 1904. 134 pp., 8vo. Toronto, 1905. *C. H. Rust, C.E.*

Toronto. The Canadian Institute. Vol. VIII., Part I. September, 1905. 212 pp., 8vo. Toronto, 1905. *The Institute.*

EXHIBITS RECENTLY ADDED TO THE MUSEUM.

Milk in Powder. "Defiance" Brand Dried Milk, and case of specimens showing proportionate component parts of new milk.

The Imperial Dry Milk Co., New Zealand and London, 17, *Fenchurch Street, E.C.*

Food. Proportionate constituents of food stuffs. Six Diagrams.

Misses A. Ravenhill & Morris (Donors).

Drinking Fountain. Standard cast iron "Crystal stream" drinking fountain for use in schools, etc., without cups, to avoid contamination.

Doulton & Co., Lambeth.

GENERAL NOTES.

THE TEACHING OF HYGIENE IN THE SCHOOLS OF THE TROPICAL COLONIES.

In the year 1903, at the suggestion of The Sanitary Institute, the Secretary of State for the Colonies addressed a circular* to the tropical colonies asking if any attempt was being made to teach the rudiments of Hygiene in the schools in the tropical Colonies, and suggesting that skilfully arranged lessons on the natural history of the causes of the most important tropical diseases might be made very attractive to children, and that such teaching would be of practical utility in the future.

Replies to this circular were received from the Colonial Governors of Eastern Colonies, South Africa, West Africa, British Central Africa, the Pacific, Mediterranean, and West Indies. A précis of these replies with a covering circular has been sent to the Institute.

From these replies it appears that in some of the Colonies much good work has already been done, and the Secretary of State is anxious that the matter should be taken up generally throughout the tropical colonies and placed as far as possible on a satisfactory basis.

The Governor of Ceylon rightly points out that if any good is to be done, the teaching should from the first be of a practical nature, that this teaching can only be given by those who have themselves acquired a practical knowledge, and that the first step must, therefore, be to give to teachers the power of handling the subject from a practical point of view.

For the instruction both of the teachers and of their pupils suitable handbooks on elementary hygiene are required. As conditions differ materially in different parts of the world, it appears that the books required for each Colony should be drawn up by the local medical authorities, who would be acquainted with the prevailing diseases in each case and would therefore be able to emphasise the reference to them in the books. The same remark applies to questions of dwellings, sites, clothing, feeding, customs, and habits.

The circular points out that it is essential that the instruction should be not only simple and practical, but also attractive, and in this connection attention is called to what has been and is being done in Sierra Leone. So far as is practicable, the hand-books should contain illustrations explanatory of the

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* A précis of this circular is printed in the Supplement to the Journal of the Institute, Vol. XXIV., p. 186.

text, or the lectures should be illustrated by magic-lantern slides, as has been done with great success in the case of Sierra Leone.

It appears that, if properly handled, the teaching of hygiene is well calculated to improve the sanitary conditions and general well-being of the tropical Dependencies.

The Training of Sanitary Inspectors in the Colonies.

In connection with the Examinations of the Institute in South Africa, Dr. Jasper Anderson, the Hon. Secretary of the Board of Examiners, gave a lecture to the Sanitary Inspectors' Association in Cape Town.

He briefly referred to the history of the public health movement in England, and the formation of The Royal Sanitary Institute and the work it had accomplished by its Examinations and Congresses. The Examinations had been extended with advantage to the Colonies, and he thought that if in South Africa they could extend the work of the Board of Examiners by occasionally holding Congresses, where anyone interested in sanitary work could either read a paper ventilating new ideas or take part in discussion, great progress would be made.

The need for inspectors to have a thorough practical training in the duties they have to carry out, and the points that should be considered in this training, were carefully set out by Dr. Anderson in his lecture. In conclusion he pointed out that the development of public health problems and their solution in Great Britain has mainly depended upon the energy and courage of the large municipalities in initiating and experimenting with legislation which has not only been lately adopted all over the country, but has been copied throughout the world. Matters of public health concern the comfort and health of the inhabitants, and should be trusted to those representatives of the people who have to look after their local concerns, are frequently in touch with them, and ought to know their needs and aspirations. It was only by municipal enterprise and activity that true progress would be made in sanitary improvement in Cape Colony, and not by constantly running to the Government when a difficulty arose, and asking for their assistance.

Personal Notes.

The Widow of a member who had been associated with the Institute for eight years, would be glad of any interest in getting one of her boys into Christ's Hospital or other Foundation School

PARKES MUSEUM NEW PREMISES FUND.

	£	s.	d.
Amount Allotted by Council	9,000	0	0
Contributions and Donations promised 1899–1904	1,101	13	0
Contributions, 1905, already Reported, including Guarantee Fund	1,500	4	6

Contributions since last report.

	£	s.	d.
James Ashton — ... ... during five years	2	10	0
The Worshipful Company of Leathersellers ...	21	0	0
Professor J. Radcliffe	21	0	0
P. Sweeney	1	1	0

November, 1905.

SUPPLEMENT.

Conference on Smoke Abatement,

DECEMBER 12, 13, 14, and 15, 1905.

A CONFERENCE AND EXHIBITION ON SMOKE ABATEMENT has been arranged by The Royal Sanitary Institute and The Coal Smoke Abatement Society to be held in London, on December 12th, 13th, 14th, and 15th, 1905, in the Royal Horticultural Society's Hall, Westminster.

The question of the Abatement of Smoke and its attendant evils in large towns, including the reduction in daylight and sunshine, has an important bearing on the Public Health. In addition to the prevention of smoke from factories, much can be done to reduce the volume of smoke from dwellings, which in the aggregate amounts to as much as that from factories, by furthering the use of Gas and Electricity and Smokeless Fuel, and encouraging improved forms of Stove and Grate Construction.

In order to discuss the various ways in which this important problem can be approached, delegates from the various Authorities and Public Bodies have been invited to the Conference.

The subjects arranged for Discussion are set out in the Programme for each day.

The EXHIBITION arranged in the GREAT HALL will be open each day to those attending the Conference from 10 a.m. to 8.30 p.m.

LIST OF AUTHORITIES WHO HAVE UP TO THE PRESENT APPOINTED DELEGATES TO THE CONFERENCE.

Birmingham.
Blackburn.
Bournemouth.
Bradford.
Bristol.
Civil and Mechanical Engineers Society.
Croydon.
Darlington.
Dartford.
Edinburgh.
Fulham.
Hackney.
Holborn.
Incorporated Association of Municipal and County Engineers.
Incorporated Society of Medical Officers of Health.
Institution of Gas Engineers.
Institution of Mechanical Engineers.
Kingston-on-Thames.
Lancashire C.C.
Leicester.
Liverpool.
London.
London (Port Sanitary Authority of).
Nelson.
North of England Institute of Mining and Mechanical Engineers.
Norwich.
Paddington.
Poplar.
Portsmouth.
Reading.
Richmond.
Rochester.
Royal Institute of British Architects.
Salford.
St. Helens.
Southall-Norwood.
Stoke Newington.
University College, London.
University of Glasgow.
University of Leeds.
Victoria University of Manchester.
Watford.
Walthamstow.
Wandsworth.
West Riding C.C.
Wigan.
Wimbledon.
Worcester.

SUPPLEMENT.

OFFICERS OF THE CONFERENCE.

President.

SIR OLIVER LODGE, F.R.S., D.Sc., LL.D.,

Principal of the University of Birmingham.

Vice-Presidents.

SIR JOHN URE PRIMROSE, Bart.
SIR WILLIAM H. PREECE, K.C.B., M.INST C.E., F.R.S.
SIR WILLIAM B. RICHMOND, K.C.B., R.A.
SIR GEORGE LIVESEY, M.INST.C.E., M.I.M.E.
SIR SHIRLEY F. MURPHY, M.R.C.S.

TUESDAY, DECEMBER 12th, 1905.

INAUGURAL MEETING OF THE CONFERENCE AND OPENING OF THE EXHIBITION.

The Chair will be taken at 8.30 p.m. by

HIS GRACE THE DUKE OF FIFE, K.T., P.C., D.L.,

In the Horticultural Society's Hall.

PRESIDENTIAL ADDRESS

By

SIR OLIVER LODGE, D.Sc., LL.D., F.R.S.

Subject:

"THE GENERAL PROBLEM OF COMBUSTION REFORM."

WEDNESDAY, DECEMBER 13th, 1905.

SUBJECT FOR THE DAY:

"DOMESTIC SMOKE ABATEMENT."

Chairman:

SIR GEORGE LIVESEY, M.INST.C.E., M.I.M.E.

11 a.m.—

Papers by:

H. A. DES VŒUX, M.D.
"The Abatement of Smoke from Private Houses."

A. S. E. ACKERMANN, B.SC.(ENG.)LOND., A.C.G.I., A.M.INST.C.E.
"The Distribution of Producer Gas as a means of alleviating the Smoke Nuisance."

SIR CHARLES COOKSON, K.C.M.G., C.B.
"Coke (Charred Coal) as a Domestic Fuel."

ARTHUR RIGG (on behalf of the Royal Botanic Society of London).
"The Destructive Effect of Smoke in relation to Plant Life."

MISS M. AGAR (Metropolitan Gardens Association).
"The Effect of Smoke on Plant Life."

S. RIDEAL, D.SC., F.I.C.
"The Acids of Smoke."

The order in which the Papers are to be read will be given in the Daily Programme.

And general discussion is invited.

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1 p.m. Luncheon.

Visit to

Chelsea Generating Station of the Underground Electric Railways Co. of London, Ltd.

Meet at the Station at 2.30 p.m.

THURSDAY, DECEMBER 14th, 1905.

SUBJECT FOR THE DAY:

"FACTORY & TRADE SMOKE ABATEMENT."

Chairman:

SIR WILLIAM H. PREECE, K.C.B., M.INST.C.E., F.R.S.

11 a.m.—

Papers by:

COMMANDER W. F. CABORNE, C.B., F.R.A.S., F.R.G.S., F.R.MET.SOC.
"Stoking and Smoke Abatement."

S. RIDEAL, D.SC., F.I.C.
"Report based upon Returns furnished by Manufacturers who have succeeded in securing the Abatement of Smoke in Factories."

JOHN B. KERSHAW, F.I.C.
"The Aims and Work of the Hamburg Smoke Abatement Society."

PROF. J. B. COHEN, PH.D., B.SC.
"A Record of the Work of the Leeds Smoke Abatement Society."

JOSEPH W. LOVIBOND.
"On Precautions necessary for making Reliable Observations of Smoke Densities."

The order in which the Papers are to be read will be given in the Daily Programme.

And general discussion is invited.

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1 p.m. Luncheon.

Visit to

Gas Works of the South Metropolitan Gas Co., Old Kent Road.

Meet at Works at 2.30 p.m.

FRIDAY, DECEMBER 15th, 1905.

SUBJECT FOR THE DAY:

"ADMINISTRATION, LEGISLATION, AND NECESSARY REFORMS."

Chairman:

SIR WILLIAM B. RICHMOND, K.C.B., R.A., L.C.C.

11 a.m.—

Papers by:

JULIAN S. CORBETT, LL.M., F.S.A. (Barrister-at-Law).
"Note on the Proposed Amendment of Section 24 (Sub-Section 6) of the Public Health Act (London) 1891."

JOSEPH HURST (Barrister-at-Law).
"English Law relating to the Emission of Smoke from Chimneys."

SIR JOHN URE PRIMROSE, Bart.
"A Plea for a Systematic, Comparative Analysis of the Air of Towns, and a Consolidation of the Law dealing with Smoke Emissions."

LAWRENCE W. CHUBB (Secretary, Coal Smoke Abatement Society).
"Report upon Returns furnished by Local Authorities, with regard to the carrying out of their powers and duties in the matter of Smoke Nuisances."

HON. ROLLO RUSSELL, M.A., F.R.MET.SOC.
"The artificial production of Persistent Fog."

W. N. SHAW, M.A., D.SC., F.R.S.
"Is London Fog inevitable?"

T. G. DEE (Sanitary Inspector, Westminster).
"Smoke Abatement from the Sanitary Inspector's point of view."

W. NICHOLSON (Smoke Inspector, Sheffield).
"The Smoke Nuisance Inspectors and Their Difficulties."

The order in which the Papers are to be read will be given in the Daily Programme.

And general discussion is invited.

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1 p.m. Luncheon.

Visit to

Abbey Mills Pumping Station, London Sewage Outfall Works.
Meet at Station about 2.30 p.m.

THE ROYAL SANITARY INSTITUTE

REVIEWS OF BOOKS.

SEWERAGE AND SEWAGE DISPOSAL.*

This book is a summary of the author's own practical experience of work in relation to water supply, sewerage and sewage disposal, comprising house drainage, trades' waste, river pollution, discharge into the sea, foreshore pollution, irrigation, ensilage, precipitation, etc. Calculations of flow in sewers are also dealt with, and a diagram has been added enabling the discharge and velocities in oval and circular sewers to be rapidly scaled, and the trouble of calculating them avoided.

The functions of micro-organisms have also been treated, and the whole forms a concise summary of the most important data, with a capital index for reference.

S. R.

A HANDBOOK OF HYGIENE.†

This handy little volume has just reached its third edition. The author has revised every section and sub-section, and brought each subject up to date. The most important advances in disposal of sewage, causation and prevention of disease, air, water, and food, have been noticed in a supplement at the end of the volume.

Every subject has been dealt with as fully as space would permit, but there has been no attempt to treat these matters from the point of view of the analytical expert.

S. R.

MODERN HOUSING IN TOWN AND COUNTRY.‡

This is a useful and interesting book, wherein is gathered together much information hitherto somewhat scattered. It does not claim to exhaust the subject or include all that has been said, written or done in the matter of housing the working classes. So much could not be comprised in one or even a few volumes; but the book contains for any student of the subject sufficient material from which to gain a fair general grasp of the housing problem, and the principal efforts made towards its solution. According to the author's statement the buildings dealt with represent an outlay of over a million sterling, whilst the whole of the schemes "actually carried out by the bodies mentioned represent no less a sum than ten millions sterling."

They are illustrated with excellent plans, sections and views; and in most cases details of construction are given, and much valuable information upon the important question of cost.

Plans and descriptions of most of the Letchworth Exhibition Cottages are included.

In looking through the many designs illustrated, one is tempted to ask why

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* Sewerage and Sewage Disposal. By Professor Henry Robinson, M.Inst.C.E. London: Biggs & Co., 139-140, Salisbury Court, Fleet Street.

† A Handbook of Hygiene. By A. M. Davies, M.R.C.S., L.S.A., D.P.H.(Camb.), Lieut.-Col. R.A.M.C. London: Charles Griffin & Co., Ltd., Exeter Street, Strand.

‡ Modern Housing in Town and Country; illustrated by examples of Municipal and other Schemes of Block Dwellings, Tenement Houses, Model Cottages and Villages; also Plans and Description of the Cheap Cottages Exhibition. 196 pp., 4to. B. T. Batsford. London, 1905. Price 7s. 6d.

it is that nearly all the municipal schemes lack the picturesqueness and architectural value which is attained generally by private individuals or companirs?

The author has himself built a colony of "model dwellings," and therefore is able to approach the subject with personal knowledge and experience, and this is borne out in much that he says.

Nevertheless arrangement of these particular dwellings is scarcely to be recommended, and it may be surmised that his knowledge of the subject generally has been gained *since* these were built. Indeed it is a pity they were included, for they show anything but a sound knowledge of planning. The cost per house, exclusive of land, appears to have been about £235. For arrangement and value they are markedly inferior to a large number of the other examples shown. Compare them, for instance, with Messrs. Rowntree's cottages near York (p. 80.)

Some notes upon the methods adopted in other countries, and especially America and Germany, would have added to the value of the work.

It is of course impossible within a limited space to review in detail all parts of a work of this kind. One seeks for the author's own summary of his conclusions, which are generally to be found in the preface or introduction. They are certainly interesting, and for the most part practical.

Nevertheless, I venture to think that modern sanitary opinion would scarcely endorse several of these conclusions—notably his suggestion that the layer of concrete required by by-laws over the whole area of a house might be omitted where there is "a good gravel subsoil." Neither will architects or sound builders agree that a hollow wall formed with two half-brick walls is constructionally a sufficient equivalent for a nine-inch solid wall.

In dealing with self-contained cottages, which, in the author's opinion, make the "ideal home," he lays it down as a rule that the house should face south-east! Surely this is "counsel of perfection." Under such a condition all the roads must be laid on an axis N.E. to S.W., and the house built on one side only! The aspect of the rooms in a house—a most important and much-neglected point—is a matter of planning, and the arrangement of the windows in the front, back, or sides of the building according to its location as a whole.

The statement that a bath is a "sine qua non" in every cottage will not meet with very general acceptance. In view of the initial cost and maintenance of baths—to say nothing of the lack of appreciation by the majority of tenants—and of many other considerations, they could well be abolished in favour of cheap *public* baths.

It is to be feared, too, that the model cottage described cannot be built for £150.

Referring to municipal enterprise the author draws attention once more to the necessity of housing schemes being carried out on commercial principles, *i.e.*, to pay, or at least so as to obviate financial loss to the ratepayers.

He adds on this subject that to "write off the cost . . . of road making, is, to say the least of it, a course devoid of sound commercial principle." That is so under existing conditions, because private enterprise is subject to this charge.

It may, however, be questioned whether the cost of making up, as well as maintaining public roads should not be borne by the community as a whole, not debited alone to the owners of the premises abutting thereon, whether private persons or public authorities. All roads are, or become, the property of the community, and it would seem fair that the community should pay for them.

This is, perhaps, in the nature of a side issue, but it has an important bearing upon the whole subject of housing.

A. S. S.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.

Hygiene of Special Classes, Trades, and Professions; and Municipal Administration.

Building Materials, Construction, and Machinery.

Water Supply, Sewerage, and Refuse Disposal.

Heating, Lighting, and Ventilating.

Personal and Domestic Hygiene.

The articles referred to in this list are as far as possible collected and filed in the Library of the Institute for the use of the Members and Associates.

Science in relation to Hygiene and Preventive Medicine.

ABRAHAM, P. S., M.D. Elementary state schools and the spread of contagious diseases of the skin. *Lancet*, Aug. 19th, 1905, p. 522.

The danger children are exposed to in school is set forth, and the need for systematic medical inspection is pointed out.

DEFRIES, WOLF, B.A., M.I.Mech.E. The essential conditions of steam disinfection. *Lancet*, Sept. 30th, 1905, p. 985.

The arguments in favour of saturated steam under pressure are fully discussed.

GREENWOOD, ALFRED, M.D. The notification of pulmonary tuberculosis in Blackburn. *Lancet*, Sept. 30th, 1905, p. 949.

Notification figures for some years are given; difficulties are pointed out; and procedure is set forth. Voluntary notification only is recommended at present.

LEEDHAM-GREEN, CHAS., F.R.C.S. Some further experiments on the sterilisation of the hands and skin. *British Medical Journal*, Sept. 30th, 1905, p. 781.

Facts are set forth to shew that for skin sterilisation, alcoholic solution of antiseptics should be used.

MACFIE, R. CAMPBELL, M.B. Sanatoriums for the poor and the eradication of consumption. *Lancet*, Sept. 30th, 1905, p. 958.

It is suggested that sanatorium treatment is comparatively useless without the adjunct of industrial colonies.

PEARSON, C. Y., F.R.C.S. Observations on sterilisation of the hands, *British Medical Journal*, Sept. 30th, 1905, p. 785.

Gives an account of experiments in methods of hand disinfection.

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The author has himself built a colony of "model dwellings," and therefore is able to approach the subject with personal knowledge and experience, and this is borne out in much that he says.

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It may, however, be questioned whether the cost of maki[illegible] maintaining public roads should not be borne by the comm[illegible] debited alone to the owners of the premises abutting [illegible] persons or public authorities. All roads are, or be[illegible] community, and it would seem fair that the commun[illegible]

This is, perhaps, in the nature of a side issue, [illegible] upon the whole subject of housing.

Raw, Nathan, M.D. Human and bovine tuberculosis with special reference to the occurrence of bovine tuberculosis in children. *British Medical Journal*, Oct. 21st, 1905, p. 1018.

The opinion advanced is that human and bovine tuberculosis are distinct and different varieties of the same species, and are capable of setting up a different train of symptoms at different periods of life. Also that intestinal tuberculosis and tabes mesenterica are generally bovine in origin from infected milk.

Skinner, Bruce, R.A.M.C. Rats in relation to plague. *British Medical Journal*, Aug. 26th, 1905, p. 427, and 16th Sept., 1905, p. 622.

Covers too much ground to indicate scope shortly.

Squire, J. Edward, C.B., M.D. The problem of how best to utilise hospitals and sanatoria in the treatment and prevention of consumption. *Lancet*, Oct. 28th, 1905, p. 1239.

Cannot shortly be set forth.

Thresh, J. C., M.D. A series of cases of lead poisoning due to hard water. *Lancet*, Oct. 7th, 1905, p. 1033.

Several instances are given in which, in the experience of the writer, lead poisoning occurred from drinking water, although of a hard character.

MEETINGS HELD.

Conference and Exhibition on Smoke Abatement in conjunction with the Coal Smoke Abatement Society.

The Conference was held in the Horticultural Society's Hall, Westminster, from December 12th to 15th, 1905. The Inaugural Meeting was held on Tuesday, December 12th, when Sir Wm. Richmond, K.C.B., R.A., presided, and read the Presidential Address by Sir Oliver Lodge, LL.D., F.R.S., who was prevented by illness from attending the meeting.

Sir Wm. Richmond also addressed the meeting, and Dr. W. N. Shaw, F.R.S., read his paper on "Is London Fog Inevitable?"

The business of the Conference was divided into three Sections. Particulars of these are given in the Supplement to the December number of the Journal (Vol. XXVI., No. 11).

The addresses of the President and the Chairman and the papers read in the respective Sections will be published in the Journal of the Institute, the first number being issued on February 1st.

During the meeting, visits were made to the Chelsea Generating Station of the Underground Electric Railways Co. of London, Ltd., H.M. Office of Works, the Gas Works of the South Metropolitan Gas Co., and to the Abbey Mills Pumping Station.

102 Delegates were officially appointed by Municipal Authorities and Scientific Institutions.

There was an average attendance each day of 150 members and delegates of this Meeting.

The Exhibition was held in the large hall and was well filled with typical appliances relating to Smoke Abatement, including Gas, Electricity, Coal and Coke Fires, Mechanical Stokers and Furnace Appliances, as well as Testing Apparatus. The general nature of the Exhibition can be gathered from the classification in page 114 of the supplement and from the List of Awards made by the Judges, given at page 155.

The Exhibits were very well arranged, much care and trouble having been taken by the Exhibitors to show the Appliances as far as possible in their appropriate setting, so as to give an idea of their appearance as well as of the purpose they were intended to serve.

One large annexe was reserved by a Gas Supply Co. and was fitted with Gas Cooking and Heating Appliances, and demonstrations on their use were given during the Exhibition; a corresponding annexe on the other side of the building was reserved for an Electrical Supply Co., and was fitted in a similar way with electrical appliances, demonstrations being given upon Electric Heating and Cooking. The Exhibition was open from 10 a.m. to 8 p.m.

EXAMINATIONS.

In Sanitary Science as applied to Buildings and Public Works.

December 1 and 2.	Manchester.	4 Candidates;	2 Certificates granted.
December 8 and 9.	London.	21 Candidates;	6 Certificates granted.

Inspectors of Nuisances.

October 2 and 5.	Hong Kong.	4 Candidates;	4 Certificates granted.
October 13 and 14.	Cape Town.	16 Candidates;	10 Certificates granted.
December 1 and 2.	Manchester.	76 Candidates;	38 Certificates granted.
December 8 and 9.	London.	87 Candidates;	46 Certificates granted.

Inspectors of Meat and Other Foods.

December 15 and 16.	London.	23 Candidates;	18 Certificates granted.

CANDIDATES WHO HAVE RECEIVED CERTIFICATES.

Sanitary Science as applied to Buildings and Public Works.

AUSTIN, CHARLES ARMSTRONG.
CLEGG, WILLIAM BENJAMIN.
COMYN, CHAS. HEATON FITZWILLIAM.
DUNGAY, ALFRED HENRY.
LARKE, JAMES PHILLIPPO.
MIDDLETON, ERNEST.
TINSON, JOHN.
TURNER, JOSEPH.

Inspectors of Nuisances.

AKERS, THOMAS HENRY.
ALLEN, FRANCIS HENRY.
ALLSOP, FRED.
ALLWRIGHT, FRANCIS.
ANNAKIN, EDWARD.
BAKER, HENRY LEAMINGTON.
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BAXTER, WALTER.

RAW, NATHAN, M.D. Human and bovine tuberculosis with special reference to the occurrence of bovine tuberculosis in children. *British Medical Journal*, Oct. 21st, 1905, p. 1018.

The opinion advanced is that human and bovine tuberculosis are distinct and different varieties of the same species, and are capable of setting up a different train of symptoms at different periods of life. Also that intestinal tuberculosis and tabes mesenterica are generally bovine in origin from infected milk.

SKINNER, BRUCE, R.A.M.C. Rats in relation to plague. *British Medical Journal*, Aug. 26th, 1905, p. 427, and 16th Sept., 1905, p. 622.

Covers too much ground to indicate scope shortly.

SQUIRE, J. EDWARD, C.B., M.D. The problem of how best to utilise hospitals and sanatoria in the treatment and prevention of consumption. *Lancet*, Oct. 28th, 1905, p. 1239.

Cannot shortly be set forth.

THRESH, J. C., M.D. A series of cases of lead poisoning due to hard water. *Lancet*, Oct. 7th, 1905, p. 1033.

Several instances are given in which, in the experience of the writer, lead poisoning occurred from drinking water, although of a hard character.

MEETINGS HELD.

CONFERENCE AND EXHIBITION ON SMOKE ABATEMENT IN CONJUNCTION WITH THE COAL SMOKE ABATEMENT SOCIETY.

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ANNAKIN, EDWARD.
BAKER, HENRY LEAMINGTON.
BASS, WILLIAM HENRY.
BAXTER, WALTER.

SUPPLEMENT.

Beaumont, Andrew.
Bird, George Wesley.
Brain, Albert Harry.
Butler, William Henry.
Carr, Walter Louis.
Carr, John Gould.
Coales, Alice Emily.
Clarke, John Henry.
Clarke, Thomas William.
Claydon, Ernest Arthur Owens.
Cotton, Arthur, junr.
Crabtree, Richard.
Cranfield, Charles Bennett.
Crawshaw, John Edwin.
Cumming, James.
Davies, Archibald John Devereux.
Dean, William James.
Driscoll, Robert.
Duncan, Robert.
Dyson, Stafford.
Edsall, Henry Moorland.
Egglestone, Elizabeth Evelyn.
Elliott, Frederick Thomas.
Elliott, Herbert.
Ellis, Walter.
Frith, Charles Edward.
Gibbs, William Charles.
Gregson, William Russell.
Griffiths, Theodore.
Grundy, Will.
Hammerton, Ernest.
Harris, Henry William.
Harris, Richard.
Hay, Henry Treffry.
Heath, Harry Vernon.
Hitchings, Lottie.
Hogarth, Ada Alice.
Holt, Walter.
Hooper, Arthur, *Sergt.-Major.*
Hughes, James Thomas.
Jarvis, Mary Sprott.
Jones, Sydney David.
Jones, William Edward.
Jupe, James Augustus.
Kitching, Richard Walter.
Laing, Charles Alexander.
Lewis, John Henry.
Light, Benjamin George.
Lock, Frederick Charles.
Lloyd, Albert Edward.
Mackenzie, Donald John.
Madeley, Richard.
Margerison, Wm.
Martland, John.
Matthews, Samuel.
Mennell, Louis Charles.
Mitchell, Oscar Parish.
Montgomery, Hugh.
Morrison, Ivor Charles.
Morton, William Henry.
Nash, James Charles.
Newell, Frank.
Old, Laura.
Plewes, Harold.
Pratt, Ernest Frederick Andrew.
Ragg, George William.
Read, George James Percy.
Rice, James.
Richards, Augustus William.
Rigby, Margaret M.
Roberts, Ernest.
Robinson, Adelaide.
Rogers, Charles Alfred.
Stacey, Henry.
Stroud, Athelstan Harvey.
Taylor, Alfred Henry.
Taylor, Georgiana Mary Stamp.
Taylor, Walter Floyd.
Thorpe, Wilfrid.
Turnbull, Frank.
Turner, John.
Waite, William.
Williams, Douglas.
Willis, Joseph Alexander.
Wilson, Harold Josiah.
Winter, Joseph Blake.
Wooldridge, Lavinia Hannah.
Wright, William George Bulbeck.

Inspectors of Meat and other Foods.

Barnes, Thomas John.
Bennett, Albert.
Caldwell, A. L., *Major.*
Conway-Gordon, G., *Major.*
Denny, William Alfred Charles *Major.*
Dodgson, C. S., *Major.*
Gaiger, Sydney Herbert.

Garnar, Edward George.
Hall, James William Wharton.
Hooke, Frederick James.
Lloyd, William.
Nugent, Ebenezer.
Ricketts, Frank.
Seccombe, Archibald Kennedy.
Sendell, Frank Guy.
Sharpe, Harry.
Taylor, Charles Henry.
Williams, Daniel Thomas.

FORTHCOMING MEETINGS.

Sessional Meetings, 1906.

The following dates and places are proposed for 1906:—

Manchester, Feb. 2nd and 3rd. Discussion on "Meat Inspection," to be opened by and on "Jointing of Pipes for Drains and Sewers," by Prof. J. Radcliffe.

London, Feb. 14th. Discussion on "Is the Intercepting Trap a Failure?" to be opened by W. Butler, M.B., D.P.H., and R. Read, A.M.Inst.C.C.

Leicester, *Derby*, *Glasgow*, *Eastbourne*, *Bournemouth*, *Belfast*, *Leeds*.

Examinations.

In Sanitary Science as applied to Buildings and Public Works, for Inspectors of Nuisances under the Public Health Act, 1875—

Plymouth, January 26th and 27th.
Glasgow, February 9th and 10th.

In Hygiene in its bearing on School Life—

Plymouth, January 26th ahd 27th.
London, February 16th and 17th.

Calendar, January and February, 1906.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesday in each Month at 5 p.m.

Exhibition Committee . . . Congress and Editing Committee	Monday in the week preceding the Council, at 4.30 p.m. & 5.30 p.m.
Examination Committee . . Museum and Library Committee	Tuesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Special Purposes Committee . Finance Committee . . .	Wednesday in the week preceding the Council, at 4 p.m. and 5 p.m.
Parliamentary Committee . New Premises Committee . Disinfectant Standardisation Committee	As occasion requires.

The Parkes Museum is open free, on Mondays 9.30 a.m. to 8 p.m., other days 9.30 a.m. to 5.30 p.m. The Library and Office are closed at 1 p.m. on Saturdays.

Council and Committee Meetings are suspended during August and September, and the Museum and Library are closed on Public Holidays.

JANUARY.

26 F. 27 S. Examination in Sanitary Science as applied to Buildings and Public Works, for Inspectors of Nuisances, and in Hygiene in its bearing on School Life, Plymouth.

FEBRUARY.

2 F. **Sessional Meeting,** at 11 a.m., MANCHESTER. Discussion on "Meat Inspection," to be opened by , and on Jointing of Pipes for Drains and Sewers, to be opened by Prof. J. Radcliffe.

3 S. Visit to Public Abattoirs, Manchester.

9 F. 10 S. Examination in Sanitary Science as applied to Building and Public Works, and for Inspectors of Nuisances, Glasgow.

12 M. Lecture to Sanitary Officers at 7 p.m. Sanitary Law, A: Introductory Remarks, Public Health Acts—English, Scotch, Irish; other Statutes relating to Public Health; By-laws (Model, etc.), Regulations, Orders, Memoranda, etc., by J. Priestley, B.A., M.D., M.R.C.S., D.P.H., M.O.H. Lambeth.

13 T. Lecture to Sanitary Officers at 7 p.m. Sanitary Law, B: Public Health (London) Act; Metropolis Local Management Acts; By-laws and Regulations in force in the Administrative County of London, by J. Priestley B.A., M.D., M.R.C.S., D.P.H.

14 W. **Sessional Meeting,** at a.m., LONDON. Discussion on "Is the Intercepting Trap a Failure?" to be opened by W. Butler, M.B., D.P.H., M.O.H., Willesden, and R. Read, ASSOC. M.INST.C.E., City Surveyor, Gloucester.

16 F. Lecture to Sanitary Officers at 7 p.m. Sanitary Law, C: Factory and Workshop Acts (including Bakehouse Legislation, 1878-95) as they affect the Sanitary Inspector; Smoke Legislation; Food and Drugs Acts, 1899, by J. Priestley, B.A., M.D., M.R.C.S., D.P.H.

16 F. 17 S. Examination in Hygiene in its bearing on School Life, London.

19 M. Lecture to School Teachers, at 7 p.m. "Physiology," by Prof. H. R. Kenwood, M.B.

19 M. Lecture to Sanitary Officers at 7 p.m. Duties of a Sanitary Inspector—General, A: Outdoor, by G. Newman, M.D., D.P.H., F.R.S.E., M.O.H., Finsbury.

21 W. Inspection and Demonstration in the District of Islington, at 2 p.m. (number limited). Conducted by James R. Leggatt, Supt., Public Health Dept., Borough of Islington.

21 W. Demonstrations in the Parkes Museum, at 6 p.m., Building Materials and Construction, by the Director, E. White Wallis, F.S.S.

21 W. Lecture to School Teachers, at 7 p.m. "Physiology," by Prof. H. R. Kenwood, M.B.

21 W. Lecture to Sanitary Officers at 7 p.m. Duties of a Sanitary Inspector—General B: Indoor, by G. Newman, M.D., D.P.H., F.R.S.E.

22 Th. Lecture. Meat Inspectors' Course at 6.30 p.m.

23 F. Lecture to School Teachers, at 7 p.m. "Physiology," by Prof. H. R. Kenwood, M.B.

23 F. Lecture to Sanitary Officers at 7 p.m. Duties of a Sanitary Inspector—C: Offensive Trades and Trade Nuisances, etc., by G. Newman, M.D., D.P.H.

23 F. Demonstrations in the Parkes Museum, at 6 p.m., Baths and Lavatories, by the Director, E. White Wallis, F.S.S.

24 S. Demonstration. Meat Inspectors' Course at 2 p.m.

24 S. Inspection and Demonstration.

26 M. Lecture to Sanitary Officers at 7 p.m. Infectious Diseases, by A. Wellesley Harris, M.R.C.S., D.P.H., M.O.H. Lewisham,

26 M. Demonstrations in the Parkes Museum, at 6 p.m., Waste Preventers and Water Closets, by the Director, E. White Wallis, F.S.S.

28 W. Lecture to Sanitary Officers at 7 p.m. Methods of Disinfection, by A. Wellesley Harris, M.R.C.S., D.P.H.

MARCH.

Annual Meeting of Associates.

APRIL.

25 W. **Ordinary General Meeting.**

JULY.

9–14 **Congress and Exhibition, Bristol.**

MEMBERS AND ASSOCIATES ELECTED.

MEMBERS.

‡ Marked thus have passed the Examination of the Institute for Sanitary Inspectors.

S Marked thus have passed the Examination of the Institute in Hygiene in its bearing on School Life.

2013 1905. Dec. BOOTH-CLARKSON, James, L.R.C.P., L.R.C.S., D.P.H., *Umzinto, Alexandra County, Natal.*

2014 1905. Dec. CAMERON, Allan Gordon Russell, M.B., B.S., D.P.H., M.R.C.S., L.R.C.P., *Dawnview Rd., Worthing.*

2015 1905. Dec. COOKE, John Edward, 48, *Wray Crescent, Tollington Park, N.*

2016 1905. Dec. ‡CRABB, Henry Ralph, ASSOC.M.INST.C.E., *Surveyor's Dept., Beckenham.*

2017 1905. Dec. HARRISON, Edward Henry, ASSOC.M.INST.C.E., "*Belgrano,*" *Thurleigh Road, Wandsworth Common, S.W.*

2018 1905. Dec. THACKERAY, John R., *Deputy Borough Surveyor, Borough Surveyor's Office, Town Hall, Eastbourne.*

2019 1905. Dec. TUBBS, Percy Burnell, F.R.I.B.A., 68, *Aldersgate Street, E.C.*

SUPPLEMENT.

ASSOCIATES.

‡ Marked thus have passed the Examination of the Institute for Inspectors of Nuisances.

3688 1905. Dec. AMOS, Archibald Drakeford Cradock, M.A.(CANTAB.), 4, *Spring Hurst Road, Shipley.*

3689 1905. Dec. ‡ARNOLD, Ernest Richard, 216, *Nechells Park Road, Birmingham.*

3690 1905. Dec. ‡BELL, William, 11, *Aiskell St. South, Sunderland.*

3691 1905. Dec. ‡BENNETT, Albert, 38, *Park Avenue North, Hornsey, N.*

3692 1905. Dec. ‡CLIBBENS, Miss E. M., 1, *High Street, Ripley, near Derby.*

3693 1905. Dec. ‡COOK, John Charles, 14, *Barley Bank Street, Darwen.*

3694 1905. Dec. ‡COPPING, John Richard, 14, *Kingston Street, Darlington.*

3695 1905. Dec. ‡DORIN, Anthony, *Oak Lea, Hexham-on-Tyne.*

3696 1905. Dec. ‡EDWARDS, Leonard, 5, *Endcliffe Hall Avenue, Sheffield.*

3697 1905. Dec. ‡EDWARDS, Richard, *Dolgelly, Merioneth.*

3698 1905. Dec. ‡FOX, Henry, 2, *Albert Street, Audley, Staffs.*

3699 1905. Dec. ‡HALL, Miss Alice E., *Nurses' Home, Boundary Street, Liverpool.*

3700 1905. Dec. ‡HARGRAVE, Ernest Leslie George, *Assistant Sanitary Inspector Municipal Buildings, Pretoria, Transvaal.*

3701 1905. Dec. ‡INNES, George Robert, *Framwellgate Moor, Durham.*

3702 1905. Dec. ‡JACKSON, John Horsley, 453, *Hessle Road, Hull.*

3703 1905. Dec. ‡KINCH, Maurice Whinley, 1, *Allison Road, Acton, W.*

3704 1905. Dec. ‡KNIGHT, Horace Julian, *Walgrave, Northampton.*

3705 1905. Dec. ‡LAKE, Charles Arthur, *Surveyor and Inspector of Nuisances, Belford, Northumberland.*

3706 1905. Dec. ‡LEA, Robert, 92, *Farndale Road, Newcastle-on-Tyne.*

3707 1905. Dec. ‡MEAKINS, Arthur John, 4, *Longmead, Lynton, Devonshire.*

3708 1905. Dec. ‡OGSTON, Alexander, 190, *Ladykirk Road, Newcastle-on-Tyne.*

3709 1905. Dec. ‡POINTON, Joseph Bertram, 4, *Nursery Villas, Morden Road, Merton, Surrey.*

3710 1905. Dec. ‡PRATT, Jesse William, *Grosvenor House, Sandgate, Kent.*

3711 1905. Dec. ‡STAZICKER, Henry, *Willow Cottage, Croston, near Preston.*

3712 1905. Dec. ‡STROTHER, Robert William, 12, *High Street, Berwick-upon-Tweed.*

3713 1905. Dec. ‡TESSEYMAN, John Robert, 17, *The Pier, Whitby, Yorks.*

3714 1905. Dec. ‡TURNBULL, Matthew, *Low Lambton, Fence Houses, Durham.*

3715 1905. Dec. ‡WALKER, William, *Belmont Villa, Ashbourne, Staffs.*

3716 1905. Dec. ‡WARD, Charles William, 22, *Water Street, Hong Kong.*

3717 1905. Dec. ‡WILLIAMS, Brainerd Stroud, "*Sydling,*" *Goddard Avenue, Swindon, Wilts.*

CONTRIBUTIONS AND ADDITIONS TO LIBRARY

*** *For Publications of Societies and Institutions, etc., see under "Academies."*

ACADEMIES (AMERICAN).

Washington. *The American Institute of Architects.* Proceedings of the Thirty-eighth Annual Convention, 1904. 273 pp., 8vo. Washington, 1905. *The Institute.*

ACADEMIES (BRITISH).

London. *The Institution of Civil Engineers.* Minutes of Proceedings with selected and other abstracted papers. Vol. CLXI. 415 pp., 8vo. London, 1905. *The Institution.*

Bern. Vorläufige Resultate der eidg. Betriebszählung vom 9 August, 1905. Résultats provisoires du recensement fédéral des entreprises agricoles, industrielles et commerciales, 9 août, 1905. 183 pp., 4to. Bern, 1905. *The Bureau de Statistique.*

Buchanan, *Major A., M.A., M.D.* Malarial Fevers and Malarial Parasites in India. Second Edition. 216 pp., 8vo. Calcutta, 1903. *Thacker, Spink, & Co.*

Johannesburg. Rand Plague Committee. Report upon the Outbreak of Plague on the Witwatersrand, March 18th to July 31st, 1904. 103 pp., fcp. Johannesburg, 1905. *W. C. C. Pakes, D.P.H., F.C.S.*

India. Thirty-seventh Annual Report of the Sanitary Commissioners for Bengal, 1904. 78 pp., fcp. Calcutta, 1905. *Capt. W. Wesley Clemesha, M.D., D.P.H., I.M.S.*

Local Government Board. Dr. Reginald Farrar's Report upon an Outbreak of Enteric Fever in the Borough of Basingstoke. No. 221. 32 pp. fcp. London, 1905. *W. H. Power, C.B., F.R.S.*

London. Report of the Departmental Committee appointed by the Board of Agriculture to inquire and report upon the Desirability of Regulations, under Section 4 of the Sale of Food and Drugs Act, 1899, for Milk and Cream, with Copy of the Minute appointing the Committee. 72 pp., fcp. London, 1901.

Minutes of Evidence taken before the Committee, with Appendices and Index. 450 pp., fcp. London, 1901. *Purchased.*

——— Report of the Inter-Departmental Committee on Medical Inspection and Feeding of Children attending Public Elementary Schools. Vol. I.: Report and Appendices. 147 pp., fcp. London, 1905. *Purchased.*

——— Royal Commission on London Traffic. Vol. I.: Report of the Royal Commission appointed to enquire into and report upon the Means of Locomotion and Transport in London. 147 pp., fcp. London, 1905. *Purchased.*

Marsh, *T. G.* Domestic Fires and their Relation to the Smoke Nuisance: a Paper read before the Society of Architects. 22 pp., 8vo. Ipswich, 1905. *The Author.*

MEDICAL OFFICERS OF HEALTH AND OTHER SANITARY REPORTS.

Aberdeen, Sept. and Oct., 1905 .. *Matthew Hay, M.D.*

Bombay, 1904 .. .. .. *J. A. Turner, M.B., D.P.H.*

Calcutta, 1904 .. .. .. *J. N. Cook, D.P.H.*
Durham C.C., 1904 .. .. .. *T. Eustace Hill, M.B., B.Sc.*
Huddersfield, 3rd quarter of year 1905 *S. G. Moore, M.D., D.P.H.*
Lancashire, C.C., 1904 .. .. *E. Sergeant, M.R.C.S.*
London (City of), thirteen weeks ending 14th October, 1905; five weeks ending 18th Nov., 1905 .. *W. Collingridge, M.D., D.P.H.*
Staffordshire C.C., 1904 .. .. *G. Reid, M.D., D.P.H.*
Tasmania, 1904–5 .. .. .. *J. S. C. Elkington, M.D., D.P.H.*
Wandsworth, 1904 .. .. .. *The Council.*

New South Wales. Report of the Board of Health on a Fourth Outbreak of Plague at Sydney, 1904; with remarks on the Ætiology of Plague, based on its observed Epidemiology, 1900–4. 26 pp., fcp. Sydney, 1905. *J. Ashburton Thompson, M.D., D.P.H.*

New Zealand. Public Health Statement by the Minister of Public Health, The Hon. Sir J. G. Ward, K.C.M.G. 77 pp., fcp. Wellington, 1905. *The Minister of Public Health.*

Queensland. Report on an Epidemic of Dengue Fever in Brisbane, by the Commissioner of Public Health. 8 pp., fcp. Brisbane, 1905. *B. Burnett Ham, M.D., D.P.H.*

Richmond, *H. Droop, F.I.C.* The Laboratory Book of Dairy Analysis. 90 pp., 8vo. London, 1905. *The Publishers (C. Griffin & Co., Ltd.).*

Sommerville, *David, B.A., M.D., D.P.H.* Practical Sanitary Science: a Handbook for the Public Health Laboratory. 304 pp., 8vo. London, 1906. *The Publishers (Ballière, Tindall, & Cox).*

Toronto. Annual Report of the City Engineer for 1904. 134 pp., 8vo. Toronto, 1905. *C. H. Rust, C.E.*

Toronto. The Canadian Institute. Vol. VIII., Part I. September, 1905. 212 pp., 8vo. Toronto, 1905. *The Institute.*

United States of America. Index-Catalogue of the Surgeon-General's Office, United States Army—Authors and Subjects. Second Series, Vol. X. M. Munikhovski. 935 pp., 4to. Washington, 1905. *The Surgeon-General.*

Wood, Drew, & Co. Water Supply: Statement relating to the undertakings of the Metropolitan Water Companies, and Analysis of the Accounts of some of the principal Provincial Water undertakings for the Year 1904–1905. 61 pp., 4to. London, 1905. *The Authors.*

In addition to the books presented to the Library, the following works connected with Sanitary Science have been published:—

Behring, *Prof. E. von.* The Suppression of Tuberculosis. *Chapman & Hall, Ltd.*

Burton-Fanning, *F. W., M.D.Cantab.* The Open-Air Treatment of Pulmonary Tuberculosis. *Cassell & Co.*

Dibdin, *W. J., F.I.C., F.C.S.* Recent Improvements for the Bacterial Treatment of Sewage. *Sanitary Publishing Co., Ltd.*

Dye, *Fredk.* A Practical Treatise on Warming Buildings by Hot Water. *E. & N. Spon, Ltd.*

Essex, *Ernest H., A.M.Inst.C.E.* Roofs and Floors of New Buildings. *St. Bride's Press.*

Hasluck, *Paul N.* Practical Plumbers' Work. *Cassell & Co.*

Heinemann, *Paul G.* A Laboratory Guide in Bacteriology. *University of Chicago Press, Chicago.*

Latham, *Arthur C., M.A., M.D.Oxon, F.R.C.P.* The Diagnosis and Modern Treatment of Pulmonary Consumption. *Baillière, Tindall, & Cox.*

Loane, *W.* Outlines of District Nursing. *Scientific Press, Ltd.*

Maxwell, *Wm. H., A.M.Inst.C.E.* British Progress in Municipal Engineering. (Three Lectures.) *A. Constable & Co.*

Perks, *Sydney.* Residental Flats of all Classes. *B. T. Batsford.*

Pollard, *S. F.* Hints to Nurses on Tropical Fevers. *The Scientific Press, London.*

Russell, *Hon. R.* Strength and Diet: a Practical Treatise, with special regard to the Life of Nations. *Longmans, Green, & Co.*

Sennett, *A. R., A.M.Inst.C.E.* Garden Cities in Theory and Practice. *A. R. Bennett.*

Spinks, *Wm.* The Drainage of Villages. *Sanitary Publishing Co., Ltd.*

Woodruff, *Major Chas. E., A.M., M.D.* The Effects of Tropical Light on White Men. *Rebman, Ltd.*

The following Journals and Periodicals have been received in the Library during 1905.

WEEKLY.

British Architect.
British Medical Journal.
Builder.
Builders' Journal and Architectural Record.
Contract Journal.
Domestic Engineering.
Engineering.
Hardware Trades Journal, The.
Health.
Indian Engineering.
Journal d'Hygiène.
Journal or the Society of Arts.
Lancet.
Local Government Chronicle.
Local Government Journal.
London County Council Gazette.
Municipal Journal.
British Journal of Nursing.
Public Health Engineer.
Sanitarisch-demographisches Wochenbulletin der Schweiz.
Sanitary Record.
Surveyor and Municipal and County Engineer.
Universal Provider.
Veterinary Record.

MONTHLY, Etc.

Annales des Ponts et Chaussées.
Architect's Magazine.
Bulletin du service de Santé et de l'Hygiène publique (Bruxelles).
Bulletin de la Société des Ingénieurs et Architectes Sanitaires de France.
Chicago Health Bulletin.
Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege.
Direzione Generale dell' Amministrazione Civile. Bollettino Sanitario.
Engineering Magazine.
Giornale della Reale Società Italiana d'Igiene.
Glasgow Medical Journal.
Indian Public Health and Municipal Record.
Iowa Health Bulletin.
Journal of Hygiene.
Journal of the American Public Health Association.
Journal of the Royal Institute of British Architects.
Journal of the Royal Meteorological Society.
Journal of the Royal Statistical Society.
Journal of the Sanitary Inspectors' Association.
Journal of Preventive Medicine.
La Ingenieria.
La Salute Pubblica (Perugia).
La Technologie Sanitaire.
Le Génie Sanitaire.
Le Mois scientifique et industriel.
Medical Magazine.
Medical Temperance Review.
Meteorological Record.
Museums Journal, The.
New York State Board of Health Monthly Bulletin.
North of England Institute of Mining Engineers' Transactions.
Plumber and Decorator.
Proceedings of the Society for the Study of Inebriety.
Public Health.
Quarry, The.
Registrar-General's Returns: England and Wales, Scotland, and Ireland. Weekly, Monthly, and Quarterly.
Revue d'Hygiène et de Police Sanitaire.
Sei-i-Kwai Medical Journal.
Société d'Hygiène de l'Enfance Bulletin Mensuel.
Surveyors' Institution, Transactions of.
Tablettes Mensuelles de la Société Royale de Médecine publique.
Technology Quarterly and Proceedings of the Society of Arts (Massachusetts).
Tuberculosis.
Water.

EXHIBITS RECENTLY ADDED TO THE MUSEUM.

Tiling, west wall entrance. Faience moulded panel fitted in vestibule. *Pilkington's Tile and Pottery Co., Ltd.*

Drain Pipes. 4 in. diameter, special jointed stoneware. *Ewing & Co.*

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Wall Lining, "Opal." Various coloured and plain slabs, external and internal rounded angles. *The Adamant Co.*

EXHIBITION OF SMOKE ABATEMENT APPLIANCES.

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LIST OF AWARDS.

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E. BENNIS & Co., LTD.—Mechanical Stoker and Self-cleaning Compressed Air Furnace.

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THE WESTMINSTER ELECTRIC SUPPLY CORPORATION, THE ST. JAMES AND PALL MALL ELECTRIC LIGHT Co. (ASSISTED BY RASHLEIGH PHIPPS & Co.)—Prometheus Electric Heaters and Cookers.

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